GAGEtrak®

Calibration Management Software Version 6.7

User Guide

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Chapter 1: Running GAGEtrak

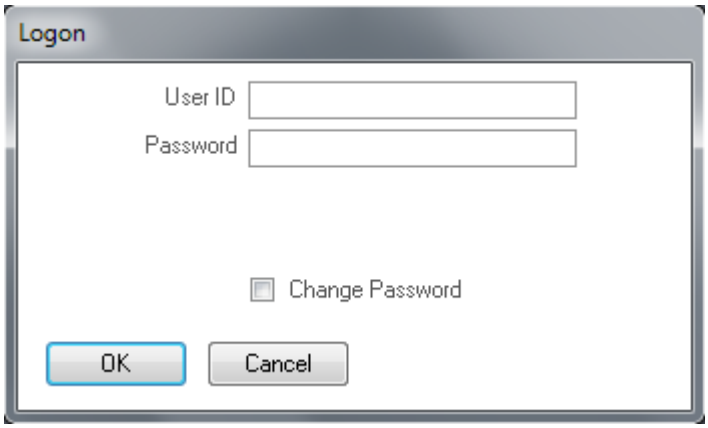
Once you have installed GAGEtrak, it's time to launch it.

Launching GAGEtrak

To launch GAGEtrak, double-click on the GAGEtrak shortcut icon that was placed on your desktop during installation or click the Windows Start button and navigate to **All Programs -> GAGEtrak 6.7** program group -> **GAGEtrak 6.7**.

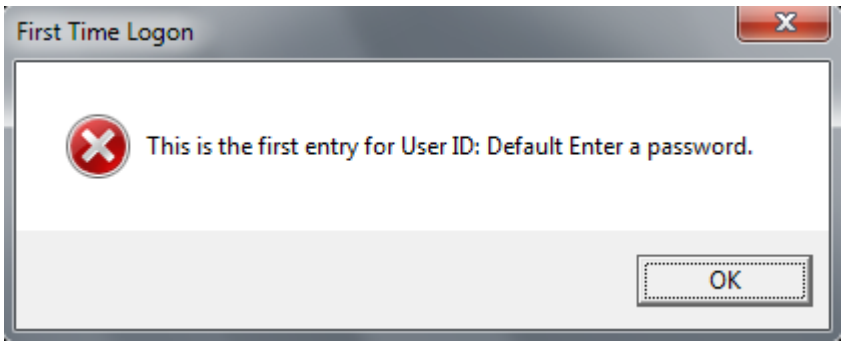
First-time Login

GAGEtrak requires users to log in if you have installed the standard application and activated security through **Settings -> Security** or if you have chosen to install the 21 CFR Compliant application (in which case security is automatically activated). The **Logon** window shown below will appear:

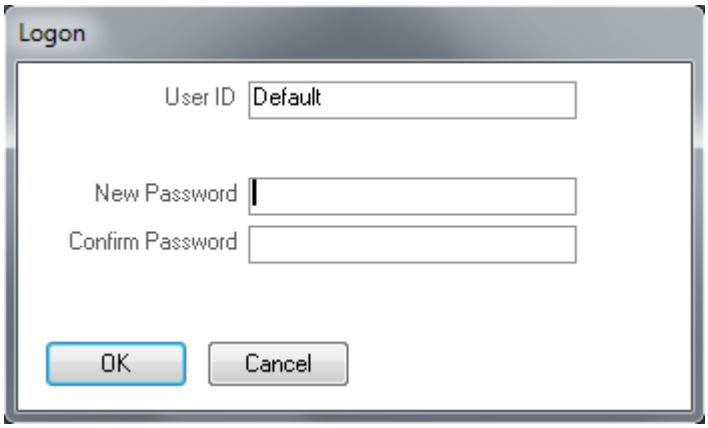


Note: The 21 CFR Part 11 Compliant version of GAGEtrak automatically activates security. Therefore, when GAGEtrak is launched for the first time, you must log in. Since your users and groups have not been set up, User ID = Default is provided so you can log in. Once you have logged in, set up your users and groups first and then delete the User ID Default. Also, the User ID is case insensitive, whereas the password is case sensitive.

Enter Default in the **User ID** field and put your cursor in the **Password** field; you will see this message:



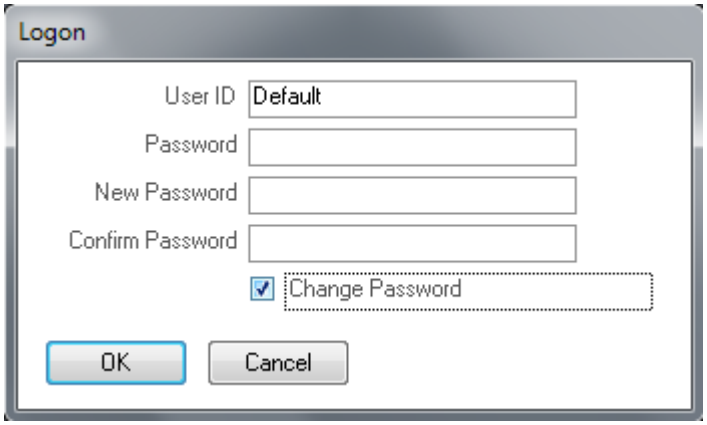
Click **OK**. The login window now appears like this:



Enter a password in the **New Password** field, enter the same password in the **Confirm Password** field and click **OK**. GAGEtrak will require you to enter this password the next time you log in.

Changing Your Password

When you want to change your password, enter your user name into the **Logon** window and then click the **Change Password** checkbox:



GAGEtrak will require you to enter your old password and then enter and confirm your new password. Click **OK**. You will receive a message that your password has been successfully entered and you'll be logged into GAGEtrak.

Chapter 2: Program Conventions

To save time and ensure consistency, GAGEtrak uses a set of program conventions, which are standard commands and design elements that make the different windows and forms operate in the same way. You can use these conventions to navigate through, add, edit and delete records. Other conventions help you retrieve and print records. Shortcut keys help you save data entry time and avoid mistakes. You should become familiar with these conventions before you begin using GAGEtrak.

Rather than repeating the same information in every section of this manual, we discuss these conventions only in this section. You'll find record-specific information, such as each record's individual purpose, fields and special buttons in the parts of this manual that discuss specific record types.

Main Menu

The main menu shows the name of the currently logged-in user in the lower left corner and shows the full path to the current data file in the lower right corner.

GAGEtrak's Help System

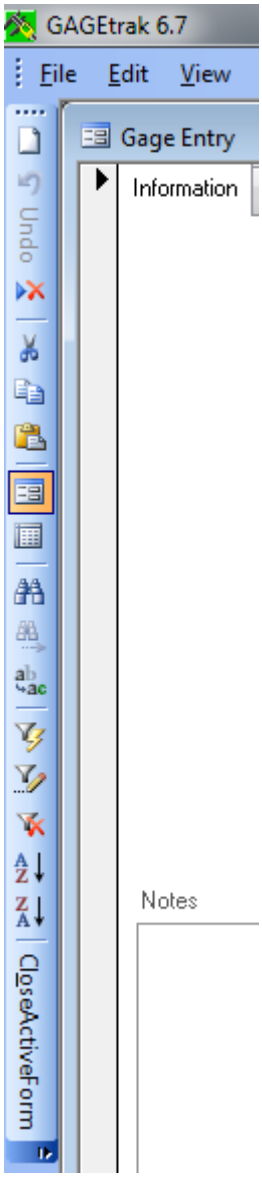
Go to the **Help** menu and select **Contents** to open GAGEtrak's Help System. Use the **Search** tab to find a specific term, select a topic from the **Contents** tab or browse an alphabetical list of topics in the **Index** tab.

Floating Toolbar

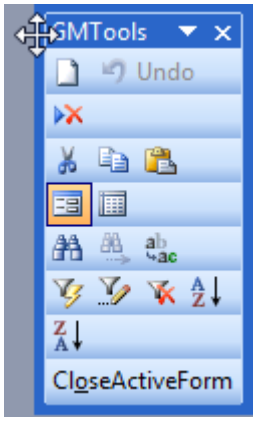
In GAGEtrak, you can access common program functions from a floating toolbar that appears in all entry screens. If you don't want the toolbar to appear, you can disable it through **Settings**. By default, the toolbar is parked in the upper left-hand corner, just below the menu.

Repositioning the Toolbar

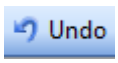
To move the toolbar, click the left side and drag it to its new location.



Moving it downward (out of the menu bar) changes the layout of the toolbar:



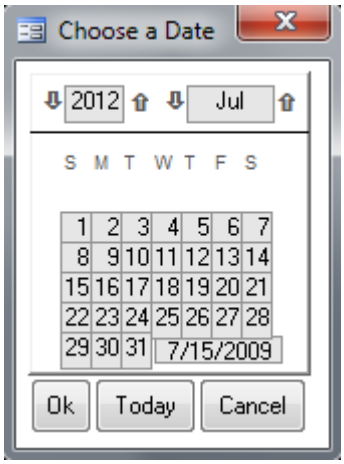
On its floating mode, click one of the edges of the toolbar and drag it to the desired size.

Toolbar Icon	Function
	Add a new record.
	Undo the last change made to the current record.
	Remove or delete a record or records. GAGEtrak asks for a confirmation to make sure you really want to make the deletion.
	Cut your selection when editing field entries and store that text on the clipboard.
	Copy your selection when editing field entries and store that text on the clipboard.
	Paste text from the clipboard into the active field.
	Display your records in Form View (the default presentation of your records). In Form View, you can see all of the fields for a record, but you can see only one record at a time.
	Display your records in Datasheet View (a tabular format). Datasheet View allows you to view many records at a time (available only in certain record entry screens).
	Place your cursor in the field by which you want to search and then click this button. The Find window opens and you can enter the information that you want to locate.
	After you've closed the Find window, click the Find Next button to locate the next instance of the information for which you're searching.
	Place your cursor in the field containing the information you want to replace. The Replace window will prompt you for Find What and Replace With. You can replace any or all occurrences of the same information.
	Use the Quick Filter to quickly find records based on a simple search.
	Use the Advanced Filter to search for a group of records that match specific criteria. You can also open previously saved criteria for use and create and save new criteria.
	Click the Show All Records icon to clear any filter and show all records.
	Sort all of your records in ascending order (numbers show before letters).
	Sort all of your records in descending order (numbers show after letters).

CloseActiveForm	Close the active form

Pop-Up Calendar for Date Fields

You can enter dates by choosing them from a pop-up calendar instead of manually typing them. Whenever you're entering information in a filter or data entry screen, double-click in any date field to view the calendar.



When the calendar first appears, if the date field is blank, then the date on the calendar will be the current date. If there is a date in the field, the calendar will show that date. To select another date, click the up or down arrow buttons to scroll to the desired month and year and then click the day of the month. Click the **Ok** button to accept the date, click the **Cancel** button to close the calendar without selecting a date or click **Today** to enter today's date in the date field.

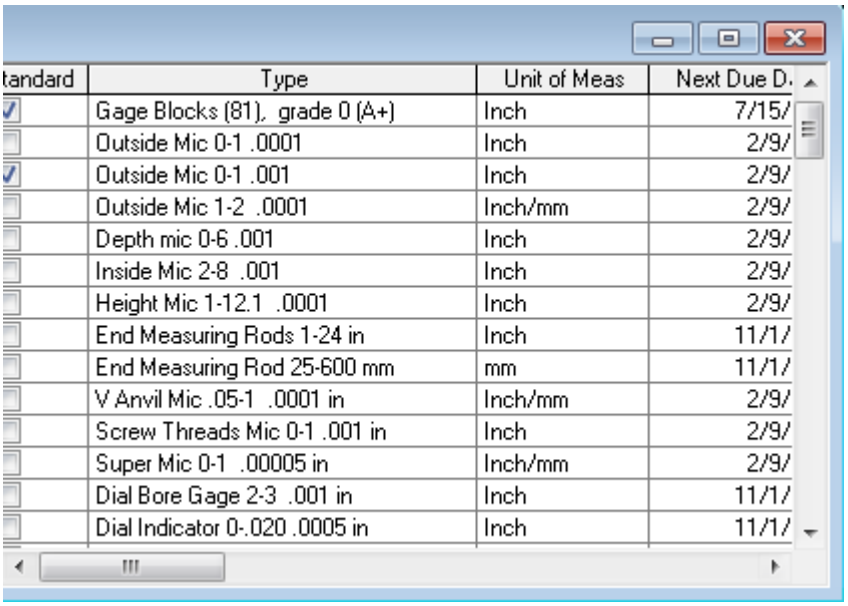
Record Navigation Bar

Use the navigation buttons (located at the bottom left corner of the form) to move through your records. Each button has an arrow on it that indicates its navigation direction.

	Go to the first record
	Go to the previous record
	Go to particular record; type in the number of the record. For example, if you have 250 records and you want to go to the sixteenth record, enter 16 in the Record box and then press ENTER to go to that record.
	Go to the next record
	Go to the last record
	Create a new record

Scroll Bars

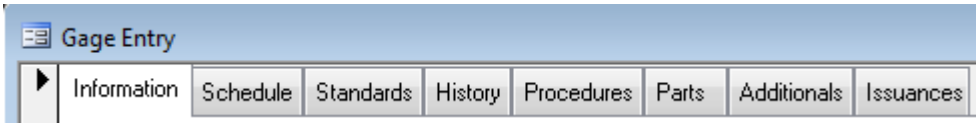
You might see scroll bars on the right, the bottom or both sides of a form. Use them to go to portions of the form that you can't see.



tandard	Type	Unit of Meas	Next Due D.
✓	Gage Blocks (81), grade 0 (A+)	Inch	7/15/
	Outside Mic 0-1 .0001	Inch	2/9/
✓	Outside Mic 0-1 .001	Inch	2/9/
	Outside Mic 1-2 .0001	Inch/mm	2/9/
	Depth mic 0-6 .001	Inch	2/9/
	Inside Mic 2-8 .001	Inch	2/9/
	Height Mic 1-12.1 .0001	Inch	2/9/
	End Measuring Rods 1-24 in	Inch	11/1/
	End Measuring Rod 25-600 mm	mm	11/1/
	V Anvil Mic .05-1 .0001 in	Inch/mm	2/9/
	Screw Threads Mic 0-1 .001 in	Inch	2/9/
	Super Mic 0-1 .00005 in	Inch/mm	2/9/
	Dial Bore Gage 2-3 .001 in	Inch	11/1/
	Dial Indicator 0-.020 .0005 in	Inch	11/1/

Tab Selectors

Each tab selector contains an entry screen that stores a specific category of information. In each tab, you can edit or view information for the current record. The tabs shown here are available in Gage Entry:



Minimize/Maximize /Restore/Close Buttons

Use these buttons, located in the upper right corner of the form, to maximize the form's size to the largest size allowed or to minimize the form to an icon. If you maximize the form, then the Maximize button changes to the Restore button. Click this button to return the window to its original size.

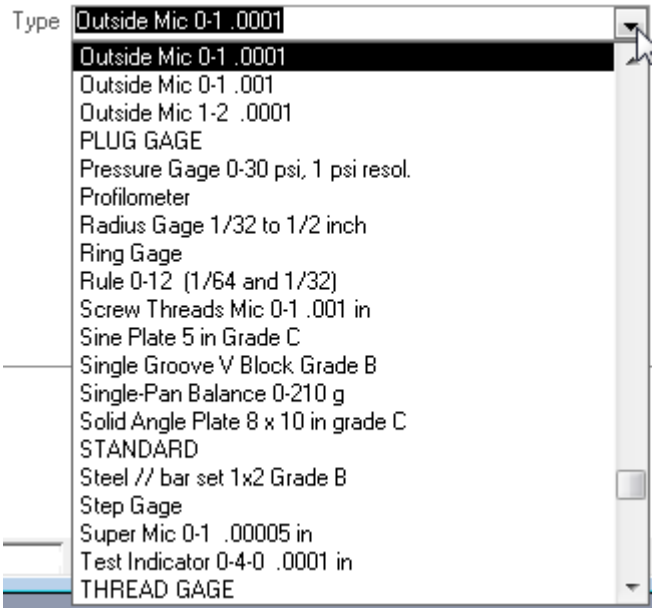
Minimize, Maximize, Close

Restore, Maximize, Close

Drop-down Lists

Drop-down list buttons indicate that a field has a list of items available from which you can choose. When you click the button, it presents the list in a scrollable box. Click on any item in the list to select it. There are two types of drop-down lists: self-building lists and value lists.

A self-building drop-down list allows you to manually enter a new value which is automatically added to the list for future selection. This type of drop-down list has only one column of data:


Type
Outside Mic 0-1 .0001
Outside Mic 0-1 .0001
Outside Mic 0-1 .001
Outside Mic 1-2 .0001
PLUG GAGE
Pressure Gage 0-30 psi, 1 psi resol.
Profilometer
Radius Gage 1/32 to 1/2 inch
Ring Gage
Rule 0-12 (1/64 and 1/32)
Screw Threads Mic 0-1 .001 in
Sine Plate 5 in Grade C
Single Groove V Block Grade B
Single-Pan Balance 0-210 g
Solid Angle Plate 8 x 10 in grade C
STANDARD
Steel // bar set 1x2 Grade B
Step Gage
Super Mic 0-1 .00005 in
Test Indicator 0-4-0 .0001 in
THREAD GAGE

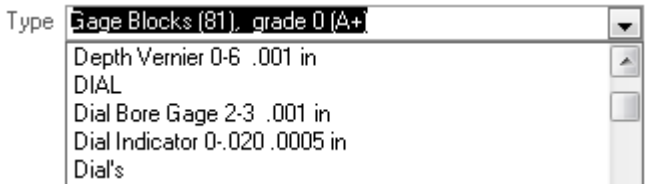
A value list contains data that is entered only via the main data entry point. This type of list typically contains two columns of data. For example, within Gage Entry, the **Supplier Code** drop-down list is a value list. You cannot enter new data in this field. Instead, you must navigate to **Supplier Entry** from the main menu and enter a new supplier record. The new **Supplier Code** will now be available in the **Supplier Code** drop-down list within Gage Entry.

Remove Unwanted Information from Drop-down Lists

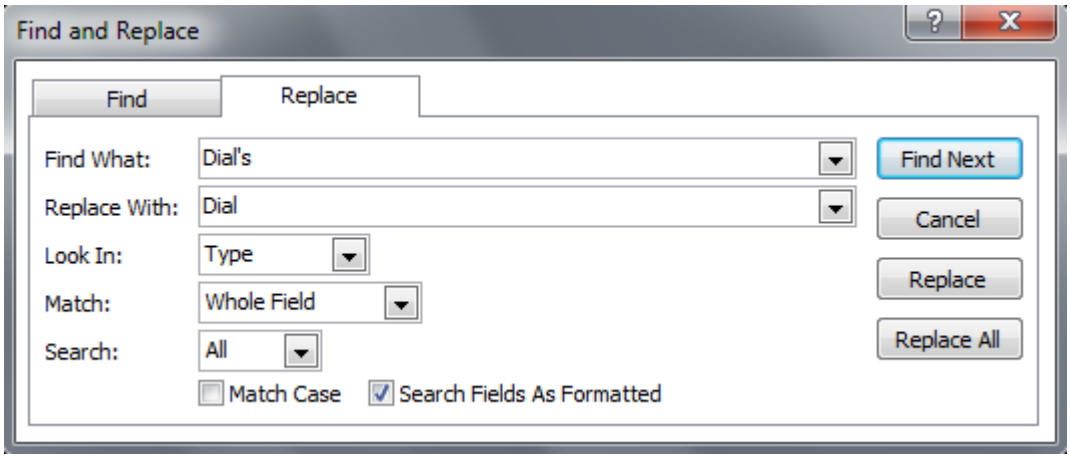
If a value list contains unwanted data, such as **Supplier Code**, you can navigate to **Supplier Entry** and uncheck the **Enabled** checkbox. This makes the supplier inactive which removes the supplier from the **Supplier Code** drop-down list for future gage entries.

If a self-building drop-down list contains unwanted data, use the **Find** button to remove the entry:

In the screen shot below, notice that the **Type** field drop-down list contains Dial and Dial's. Dial's is incorrect and should be removed from the dropdown list.



1. Place the cursor in the field that contains the incorrect data, (in this case the **Type** field).
2. Click the **Replace** icon on the floating toolbar.
3. Enter the value you wish to remove or replace in the **Find What** field.
4. If you want to remove the value altogether, leave the **Replace With** field blank. Otherwise, if you want to replace the value with some other value, then type the new replacement value in the **Replace With** field:



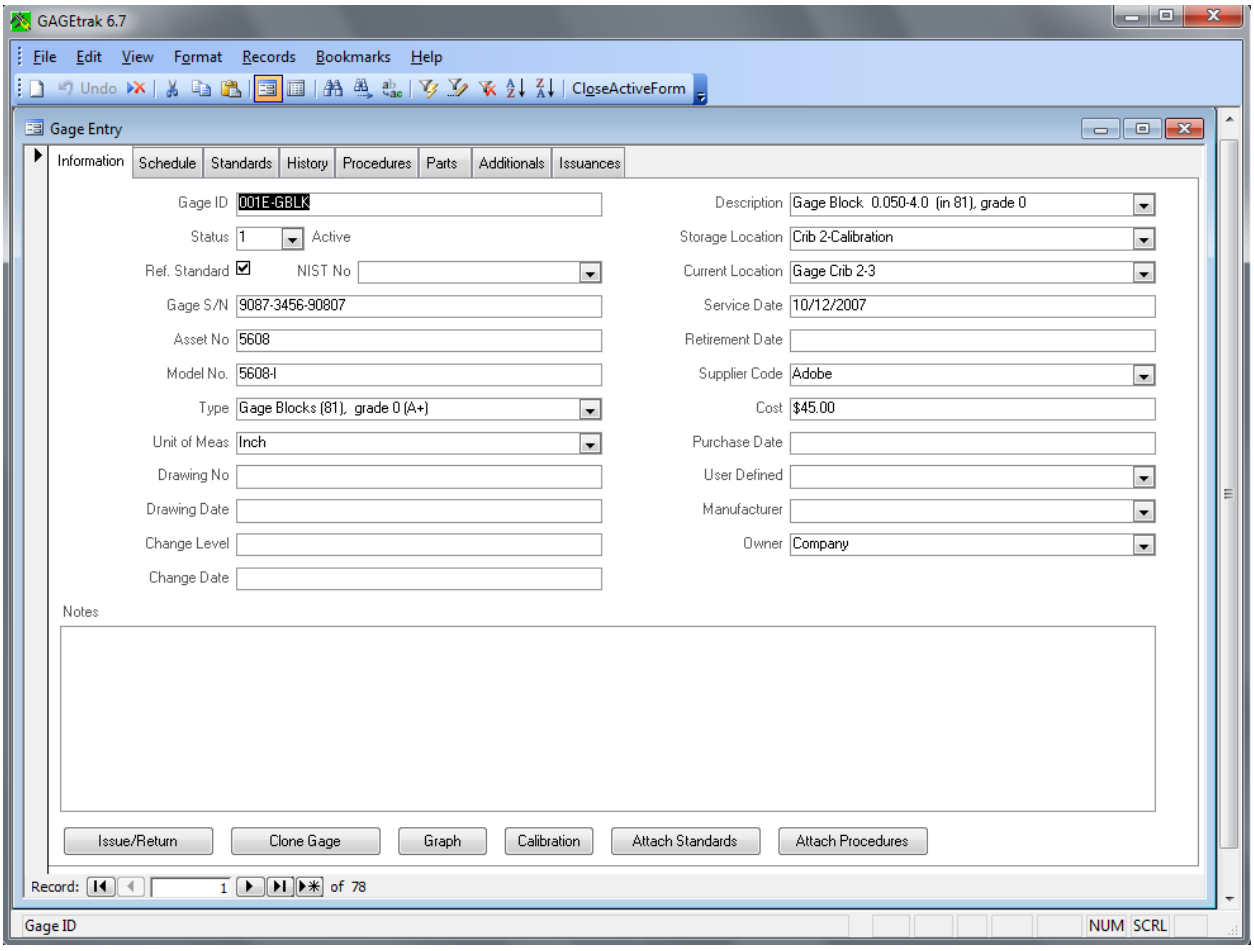
5. Click the **Replace All** button. A message box will remind you that you cannot undo this operation.
6. Click **Yes** and then close the **Find and Replace** form.
7. Open the **Type** drop-down list to verify the deletion of Dial's.

Form View of Records

After you click **Find** in a filter window, GAGEtrak looks through your database and opens the first record in the set, displaying it in Form View. Form View of records show you only one record at a time, while Datasheet (table) View displays many records at a time (each row represents a record and many rows (records) are displayed at once).

Form View is the default presentation of your data (use the toolbar or the View menu to switch between Form and Datasheet Views).

Sample Form View of a Gage Record:



Elements of a Record in Form View

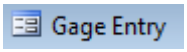
All record forms have the following elements:

Form Title Bar: Located at the top of each form, the title bar shows the form's name (Gage Entry in the above example). Click the title bar to drag the form to a new location.

Menu Bar: Located above the title bar, the menu bar usually has menus for File, Edit, View, Format, Records, Bookmarks and Help. Click on a menu title and a list of commands will appear.

Some items may not be available (they appear gray). If commands are unavailable, you can't use them in Form view.

Control Menu Icon: Click on this icon, located to the left of the name on the title bar, to change the window's size and location. Double-click on it to close the window.
Control Menu Icon in Gage Entry:

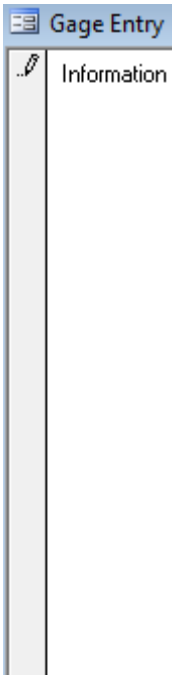


Record Selector Bar: You can use the record selector bar, a tall rectangular bar located on the left side of the form, to select the entire record for copying or deletion.

No record changes have been made; record is not selected for copying or deletion:

Record has been selected for copying or deletion:

If a record has been modified, a pencil icon appears on the bar:



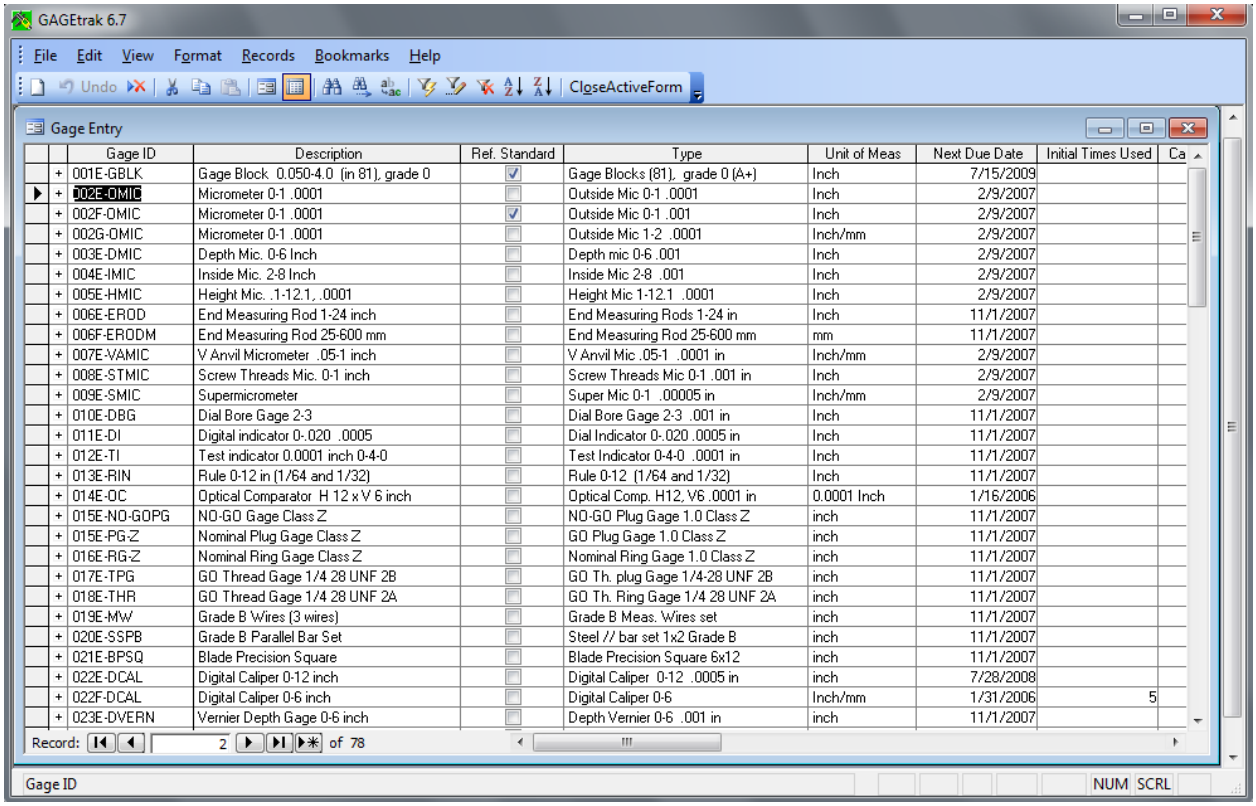
Click on the bar to save your changes.

Datasheet View of Records

Datasheet View (table view) allows you to see many records at once. Because of this, they can be a more efficient interface for adding or modifying your records. Datasheet View operates like a spreadsheet program. Each row represents a record and each column represents a field. In Datasheet View, you can add, change and view records. This format offers more flexibility in that you can resize column widths and row heights, rearrange column positions and even hide columns.

Since the program automatically presents records in Form View, you must manually switch to Datasheet View (use the toolbar icon or select Datasheet View from the **View** menu).

Sample Datasheet View of Gage Records:


GAGEtrak 6.7
File Edit View Format Records Bookmarks Help
Undo
CloseActiveForm
Gage Entry
Gage ID | Description | Ref. Standard | Type | Unit of Meas | Next Due Date | Initial Times Used | Ca
001E-GBLK | Gage Block 0.050-4.0 (in 81), grade 0 | Gage Blocks (81), grade 0 (A+) | Inch | 7/15/2009
002E-OMIC | Micrometer 0-1 .0001 | Outside Mic 0-1 .0001 | Inch | 2/9/2007
002F-OMIC | Micrometer 0-1 .0001 | Outside Mic 0-1 .001 | Inch | 2/9/2007
002G-OMIC | Micrometer 0-1 .0001 | Outside Mic 1-2 .0001 | Inch/mm | 2/9/2007
003E-DMIC | Depth Mic. 0-6 Inch | Depth mic 0-6 .001 | Inch | 2/9/2007
004E-IMIC | Inside Mic. 2-8 Inch | Inside Mic 2-8 .001 | Inch | 2/9/2007
005E-HMIC | Height Mic. .1-12.1, .0001 | Height Mic 1-12.1 .0001 | Inch | 2/9/2007
006E-EROD | End Measuring Rod 1-24 inch | End Measuring Rods 1-24 in | Inch | 11/1/2007
006F-ERODM | End Measuring Rod 25-600 mm | End Measuring Rod 25-600 mm | mm | 11/1/2007
007E-VAMIC | V Anvil Micrometer .05-1 inch | V Anvil Mic .05-1 .0001 in | Inch/mm | 2/9/2007
008E-STMIC | Screw Threads Mic. 0-1 inch | Screw Threads Mic 0-1 .001 in | Inch | 2/9/2007
009E-SMIC | Supermicrometer | Super Mic 0-1 .00005 in | Inch/mm | 2/9/2007
010E-DBG | Dial Bore Gage 2-3 | Dial Bore Gage 2-3 .001 in | Inch | 11/1/2007
011E-DI | Digital indicator 0-.020 .0005 | Dial Indicator 0-.020 .0005 in | Inch | 11/1/2007
012E-TI | Test indicator 0.0001 inch 0-4-0 | Test Indicator 0-4-0 .0001 in | Inch | 11/1/2007
013E-RIN | Rule 0-12 in (1/64 and 1/32) | Rule 0-12 (1/64 and 1/32) | Inch | 11/1/2007
014E-OC | Optical Comparator H 12 x V 6 inch | Optical Comp. H12, V6 .0001 in | 0.0001 Inch | 1/16/2006
015E-NO-GOPG | NO-GO Gage Class Z | NO-GO Plug Gage 1.0 Class Z | inch | 11/1/2007
015E-PG-Z | Nominal Plug Gage Class Z | GO Plug Gage 1.0 Class Z | inch | 11/1/2007
016E-RG-Z | Nominal Ring Gage Class Z | Nominal Ring Gage 1.0 Class Z | inch | 11/1/2007
017E-TPG | GO Thread Gage 1/4 28 UNF 2B | GO Th. plug Gage 1/4-28 UNF 2B | inch | 11/1/2007
018E-THR | GO Thread Gage 1/4 28 UNF 2A | GO Th. Ring Gage 1/4 28 UNF 2A | inch | 11/1/2007
019E-MW | Grade B Wires (3 wires) | Grade B Meas. Wires set | inch | 11/1/2007
020E-SSPB | Grade B Parallel Bar Set | Steel // bar set 1x2 Grade B | inch | 11/1/2007
021E-BPSQ | Blade Precision Square | Blade Precision Square 6x12 | inch | 11/1/2007
022E-DCAL | Digital Caliper 0-12 inch | Digital Caliper 0-12 .0005 in | inch | 7/28/2008
022F-DCAL | Digital Caliper 0-6 inch | Digital Caliper 0-6 | Inch/mm | 1/31/2006 | 5
023E-DVERN | Vernier Depth Gage 0-6 inch | Depth Vernier 0-6 .001 in | inch | 11/1/2007
Record: 2 of 78
Gage ID
NUM SCRL

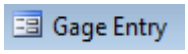
Elements of a Record in Datasheet View

All Datasheet View windows have the following elements:

Title Bar: Located at the top of each table, the title bar contains the table's name (Gage Entry in the above example). Click the title bar to drag the table window to a new location.

Menu Bar: The menu bar, located above the title bar, typically has menus for File, Edit, View, Format, Records, Bookmarks and Help. To select a menu, click on the menu title and a list of menu commands will appear. Some menu items may not be available (they will appear gray).

Control Menu Icon: Click on this icon, located to the left of the title bar, to change the table window's size and location. You can also use it to close the window.



Record Selector Buttons: Record selector buttons are small rectangular buttons located on the far left side of each row. Use them to select the entire record for copying or deletion. You can also use them to store any changes made to the record—if you change any fields, an icon of a pencil will appear on the button; click on the button to write your changes to the database.

You can select multiple records by clicking and dragging your mouse pointer over the desired records. To select all records between two records, first click on the first record, then hold the SHIFT key while you click on the last record. This operation selects all records between the first and last records.

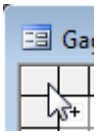
A selector button that has an asterisk (*) on it indicates that a row is a new record position (it will always be located at the bottom of the table):

	+	WT2	WEIGHT STD, 100 GRAMs, CLASS 3	☑	STANDARD	100 GRAMS	1/6/2003
	+	WT90	WEIGHT STD, 5000 GRAM, CLASS 3	☑	DIAL	5000 GRAM	9/8/2003
*				☐			

Record Selector Bar Symbols:

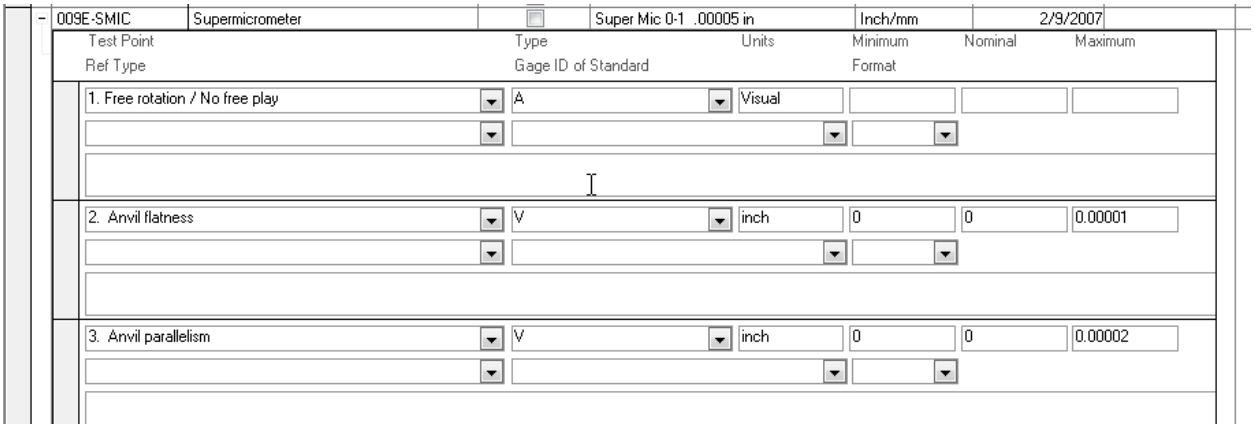
Current Record

New Record

 All Records Selection Button: This small square button is located on the upper left portion of the table, just below the control menu icon. Click it to select all records in the table.

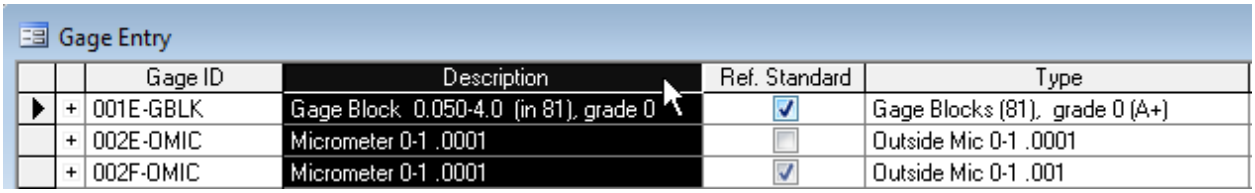
Record Expand/Contract Symbol Field

This icon expands or contracts a record row to show other related tables. The “+” symbol is to expand and the “-” is to contract gage ID history.



Column Selector Button

Each column selector button (column header) contains the name of the field that it represents ("Gage ID" and "Description" in the example below). When you click on a column header, you select the entire column, i.e., the **Description** column shown here:



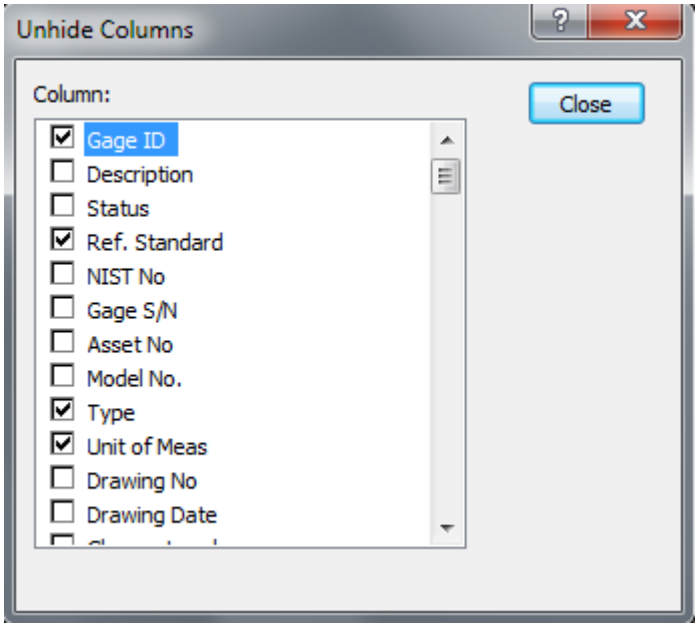
You can then work with it as a whole. For example, click the column header to select a column that you want to move or hide. You cannot move the contents of one column to another column.

Hiding and Displaying Columns

You can temporarily hide columns while in Datasheet View. This feature helps you remove nonessential data from the screen and reduce a report's width when you're designing a custom report.

To hide columns, select the column selector button you want to hide, (column header). To hide multiple columns, drag across multiple column selector buttons. When all desired columns for hiding are selected, select the **Format** menu and choose **Hide Current Column**.

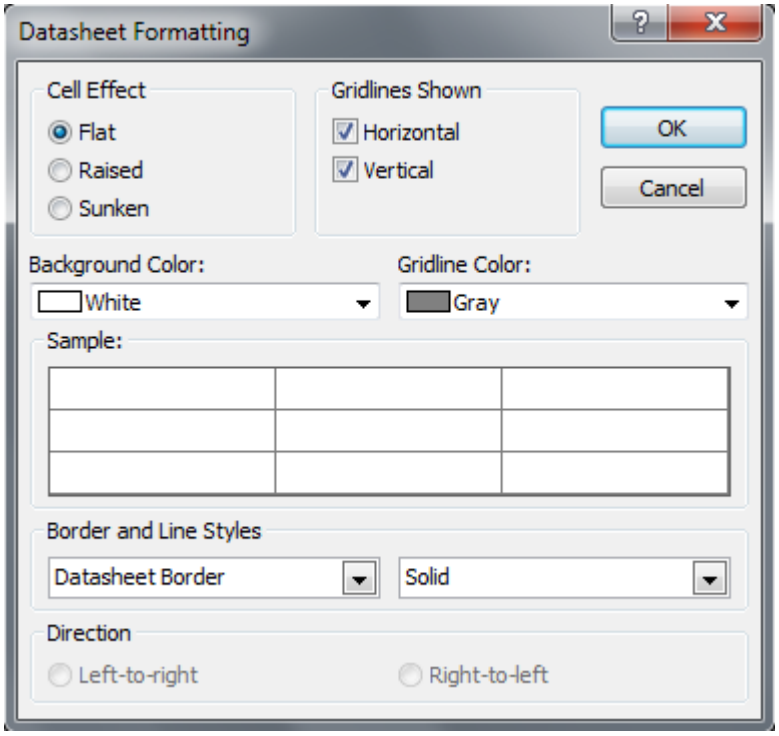
To Display Hidden Columns, go to the **Format** menu and choose **Show/Hide All Columns**:



In the **Unhide Columns** window, check the checkbox of the column name you want to show. When you've selected all the columns you want visible, click **Close**.

Hiding and Displaying Gridlines

By default, the program shows gridlines around each cell in Datasheet View. Select **Gridlines** from the **Format** menu:



Remove the checkmarks from the **Horizontal** and/or **Vertical** checkboxes to remove the gridlines.

Changing the Row Height

To adjust the height of all rows in a table, choose **Row Height** from the **Format** menu and entering the desired value in the **Row Height** field. The default row height is 10.5. The default row height will be retained if the **Standard Height** checkbox is checked.

Changing the Column Width

Choose **Column Width** from the **Format** menu and enter the desired width in the **Column Width** field. The default column width is 18.8. The default column width will be retained if the **Standard Width** checkbox is checked.

Freeze and Unfreeze Columns

To prevent columns from moving off the screen (freeze columns), select the columns you want to freeze and choose **Format -> Freeze Columns**. If you haven't selected any columns when you choose this command, the program freezes the column in which your cursor is active. GAGEtrak

adds new frozen columns to the right of existing frozen columns. A bold line separates the frozen and unfrozen columns.

To release frozen columns, choose **Format -> Unfreeze Columns**. When you unfreeze columns, they remain in the same order they were in while frozen. You can't unfreeze specific columns; you can only release all frozen columns at once.

Saving Changes in Datasheet View

Any changes made to a Datasheet View, such as column widths, displayed/hidden columns, column locations, gridlines and fonts, will be saved when you close the screen. Datasheet formatting is retained within the program file in the current application installation; new application installations show the default datasheet layout.

Filters

Some reports open with filter windows that you can use to select a subset of records that match the criteria you enter. This may not seem useful at first, but you will appreciate this feature later when you have hundreds or thousands of records from which to select. GAGEtrak's Quick Filter and Advanced Filter commands may be used to find a subset (dynaset) of records that match the criteria you enter.

Supported Wildcard Characters in Search Fields

The asterisk (*), question mark (?), number sign (#), exclamation point (!), hyphen (-) and brackets ([ ]) are all wildcard characters. You can use them in record filters and in Find/Replace commands to include all records that begin with specific characters or match a certain pattern.

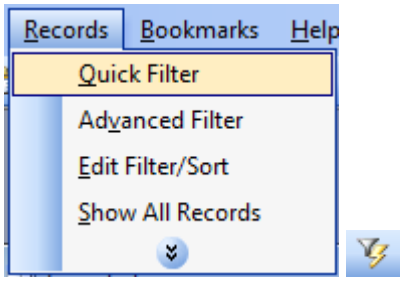
Character	If You Enter	GAGEtrak Finds
*	wh*	what, white, and why; works like MS-DOS commands
*	*at	cat, bat, and what
?	b?ll	ball, bell, and bill; ? matches any single character
#	1#3	103, 113, 123; matches any single digit (not for use with date fields—use asterisk (*) instead)

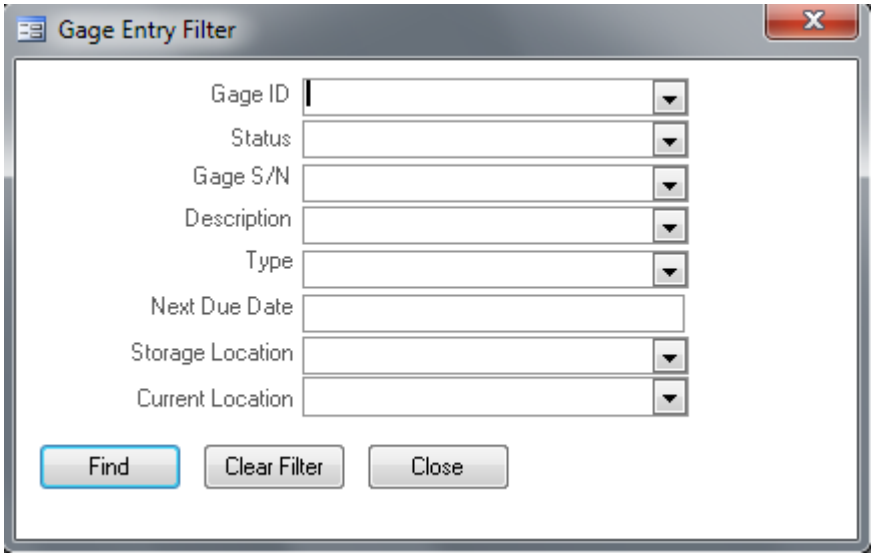
[ ]	b[ae]ll	ball and bell, but not bill; matches any single character within the brackets
!	b[!ae]ll	bill and bull, but not bell; matches any character not in the list between the brackets
-	b[a-c]d	bad, bbd, and bcd; matches any one of a range of characters

Tip: Because GAGEtrak allows a literal search on these characters, to find **Machine #1**, for instance, you would enter **Machine [#]1**.

Quick Filter

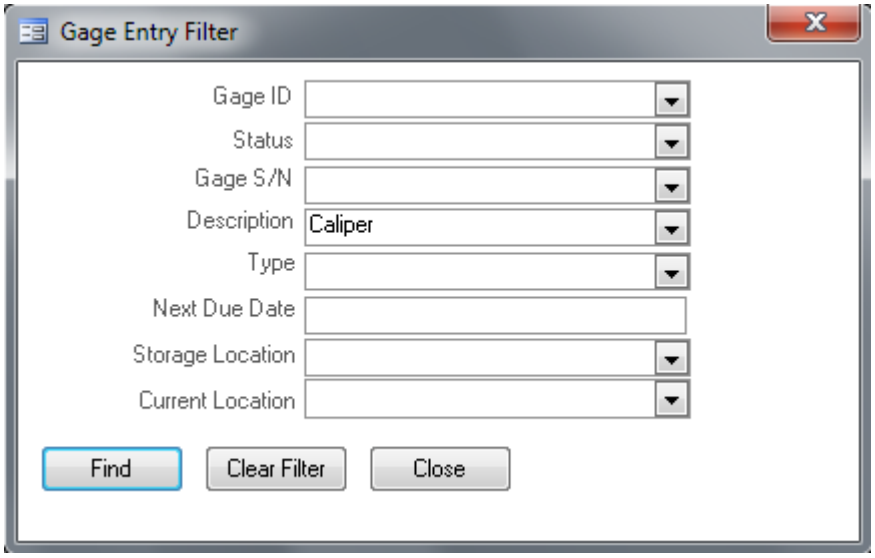
Use the **Quick Filter** command when you need to quickly find records based on a simple search. **Quick Filter** is accessible from the **Records** menu and the program toolbar.



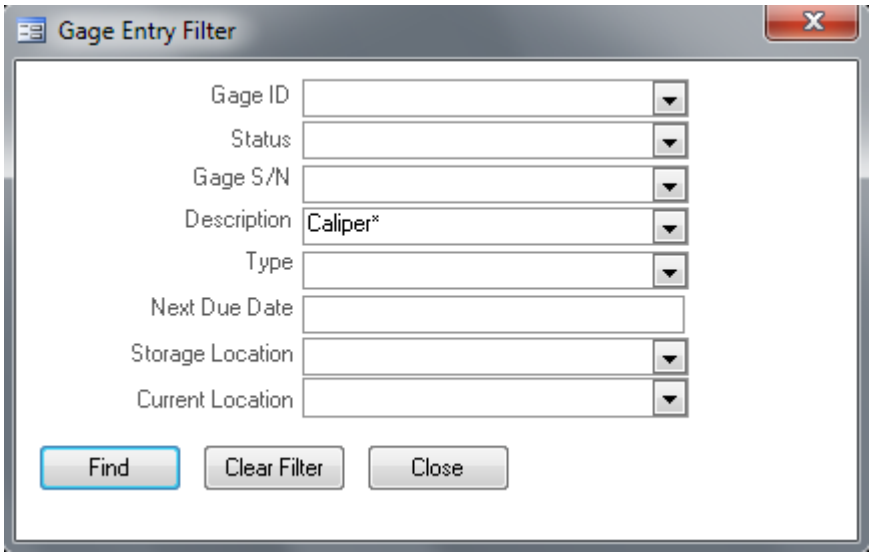


Quick Filter Example

If you want to access gage records that have descriptions exactly equal to **Caliper**, enter Caliper in the **Description** field in the Gage Entry filter (access the **Quick Filter** from within Gage Entry).



If you want to find gage records with descriptions that start with Caliper, such as Caliper 6-inch and Caliper Digital, then enter **Caliper*** in the **Description** field of the Quick Filter. The asterisk (*) is a wildcard character that indicates, in this example, that you want all gage records that have a description starting with the word Caliper.

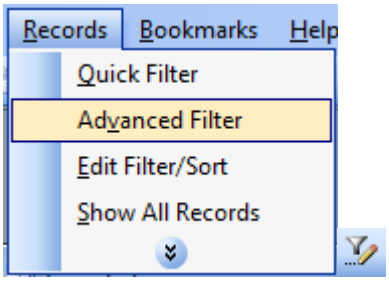


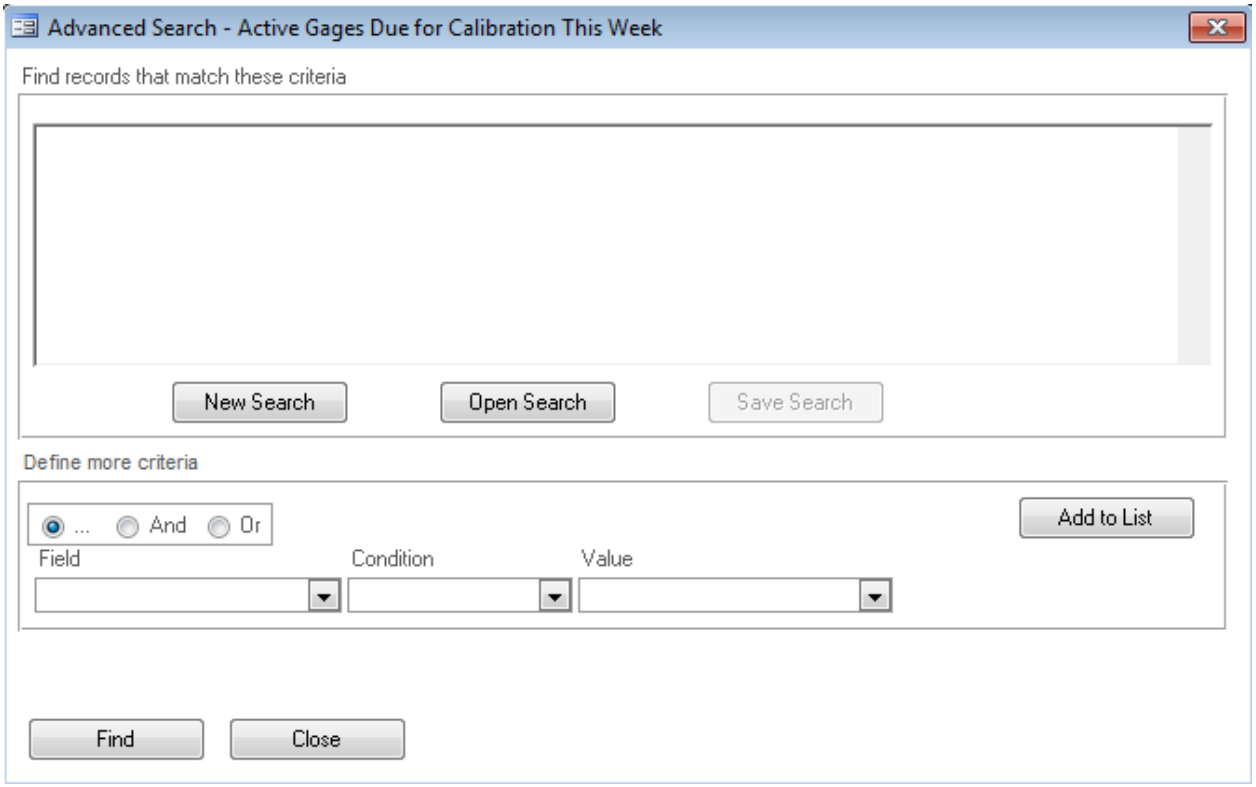
Likewise, if you enter ***Caliper**, it tells the program that you want all gage records with descriptions ending in the word Caliper, such as 4-inch Caliper. Furthermore, if you enter ***Caliper***, it tells the program that you want all gage records with descriptions containing the word Caliper, such as 4-inch Caliper and Caliper Digital.

You can specify as many filter fields as you need, depending on how selective you want to be. After you enter any filter values, click the **Find** button to view the filtered record set. To remove any filter information, click the **Clear Filter** button.

Advanced Filter

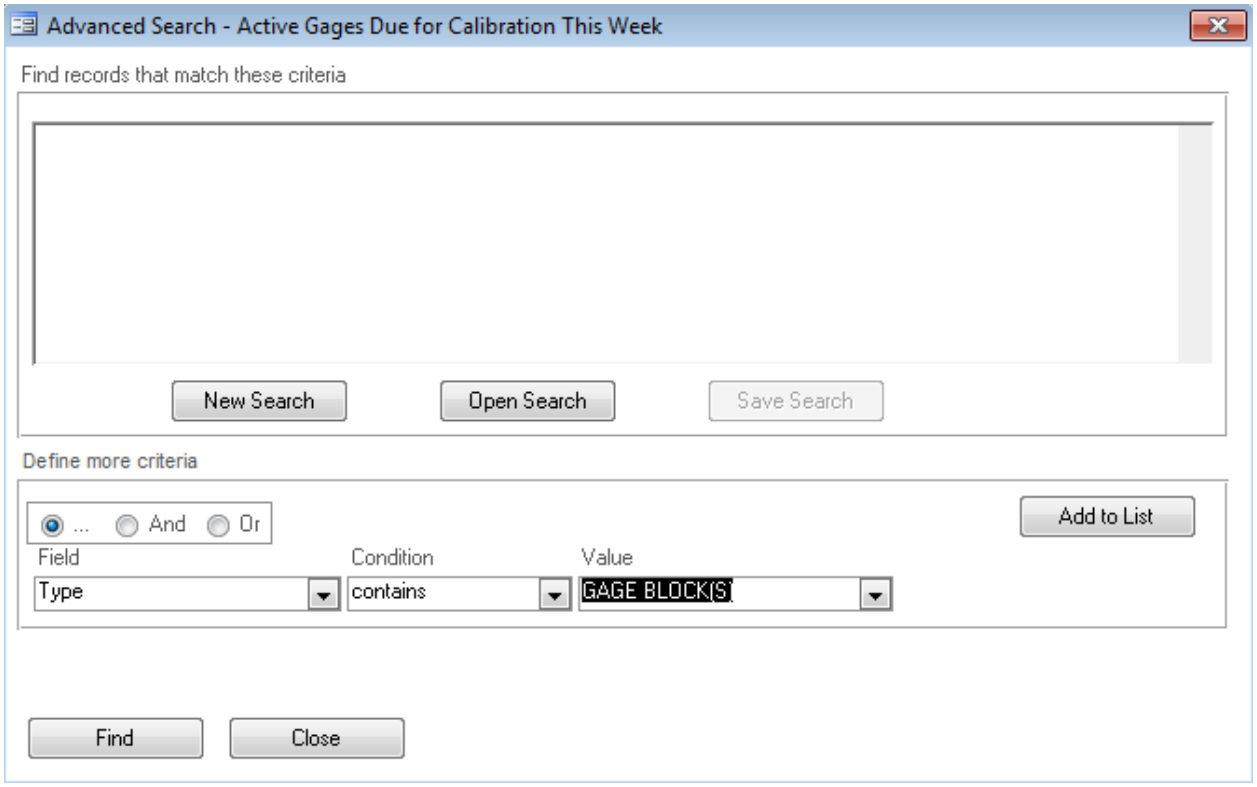
Use the **Advanced Filter** command when you need to find a particular record or group of records. This command allows you to set up customized search filters for your records, searching by any or all fields in the form. You can even save search criteria so that you don't have to set up the same searches repeatedly. An unlimited number of frequently used searches can be saved and retrieved. The **Advanced Filter** is accessible from the **Records** menu and the program toolbar.



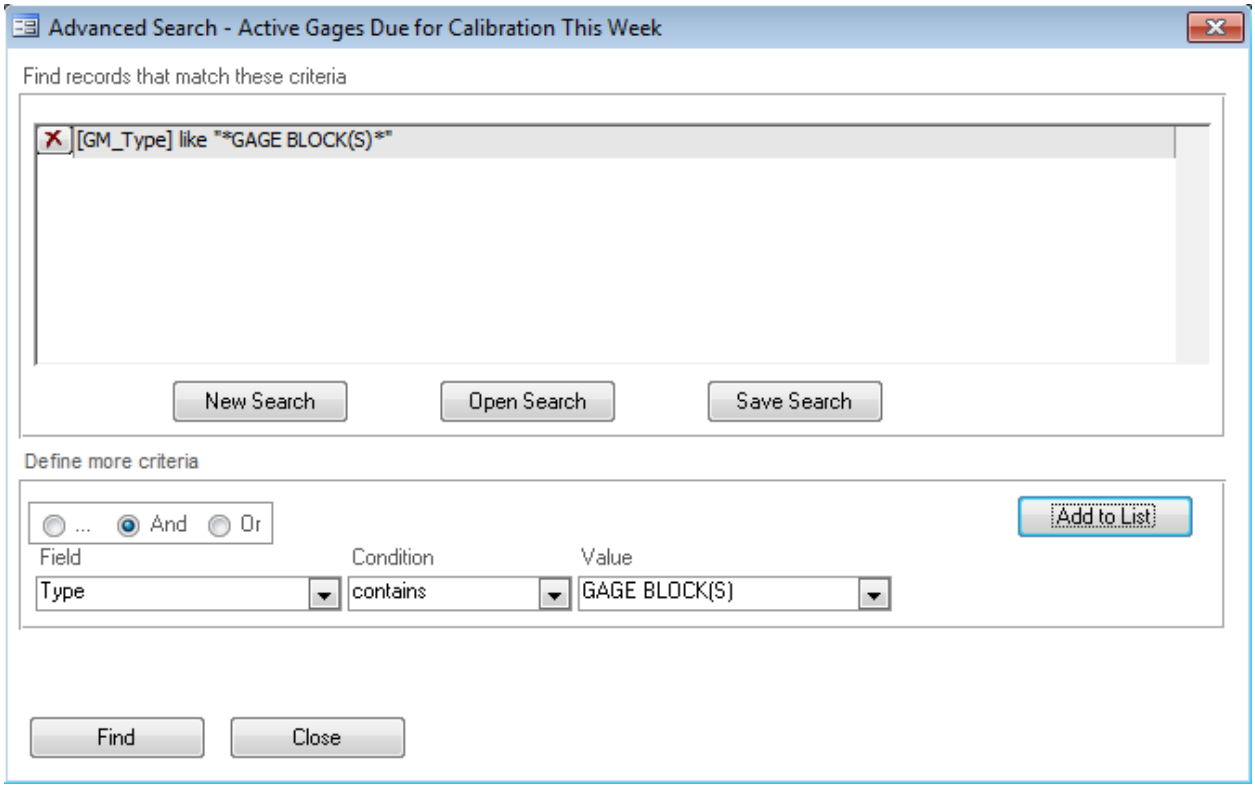


Advanced Filter Example

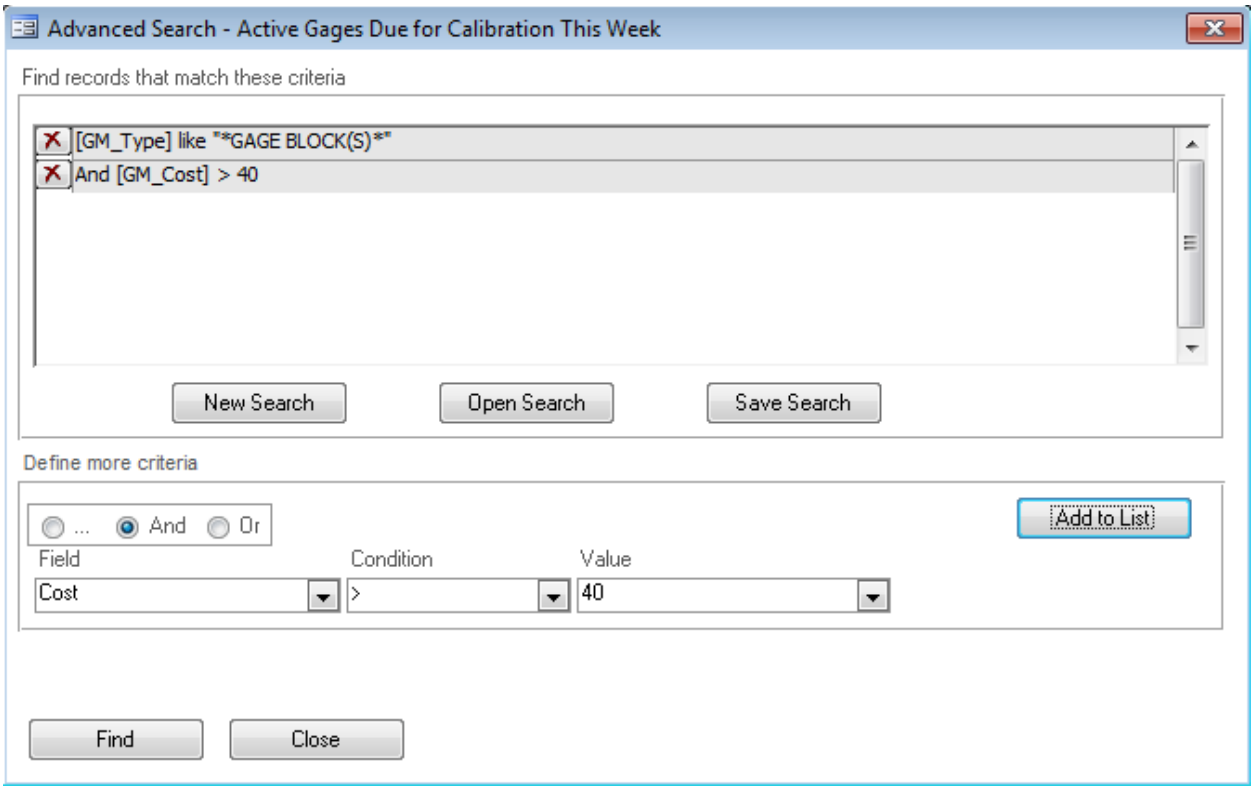
To set up a criterion, select values for the **Field**, **Condition** and **Value** fields (make sure you select the **[…]** radio button for the first criterion):



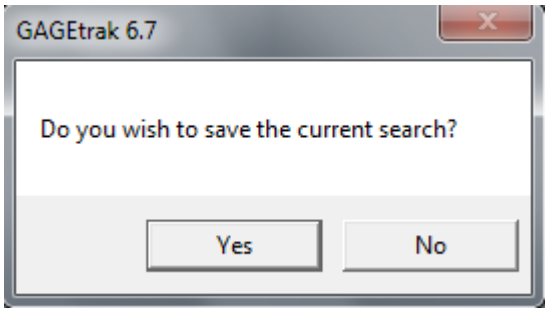
Click the **Add to List** button. The criterion is then shown in the upper portion of the window:



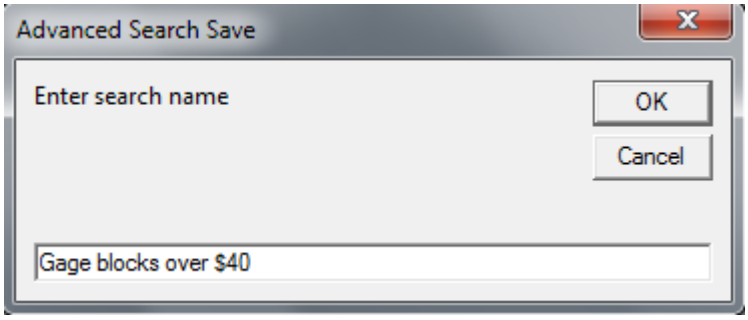
You can add unlimited criteria by selecting the appropriate join condition of **And** or **Or**. You can edit directly in the criteria field, provided you know the right syntax.



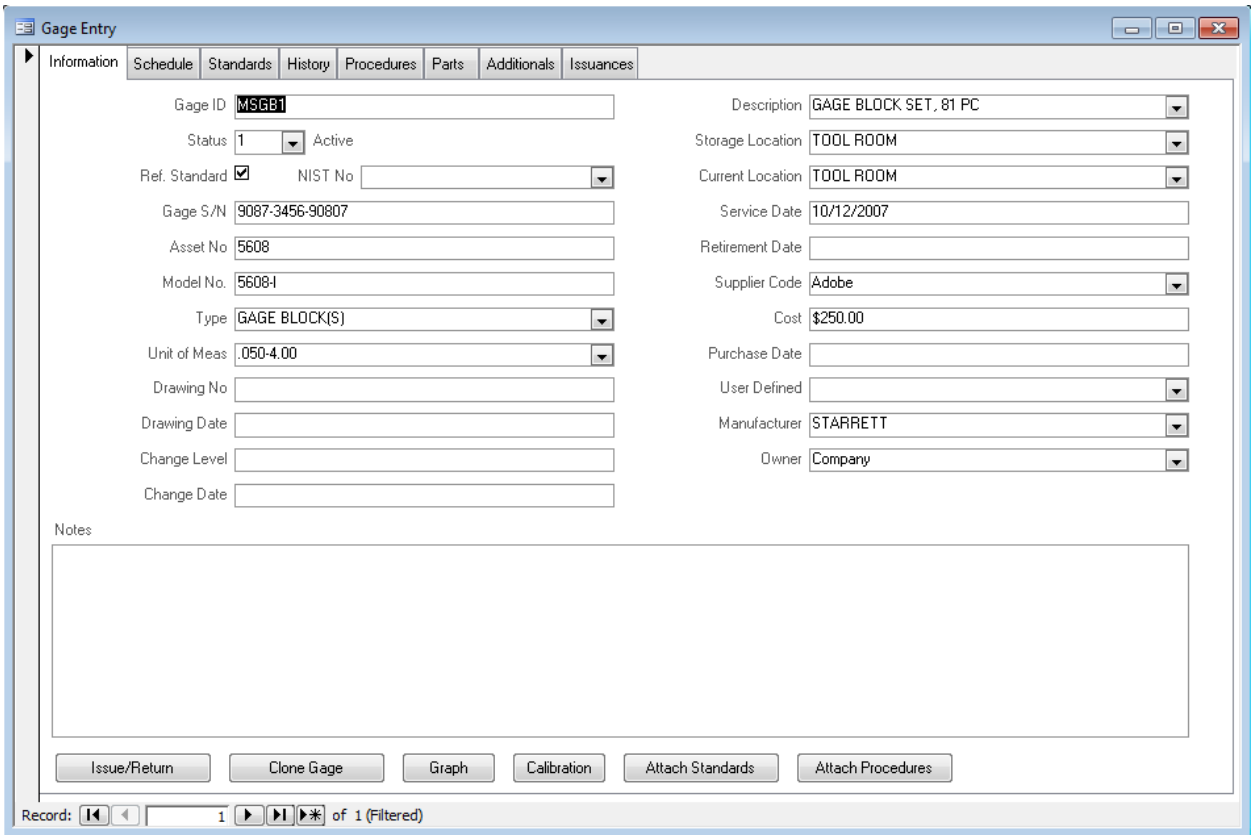
After entering all criteria, click the **Find** button. GAGEtrak will ask if you'd like to save your search:



Click **No** to proceed to your filtered records; click **Yes** to save your search:

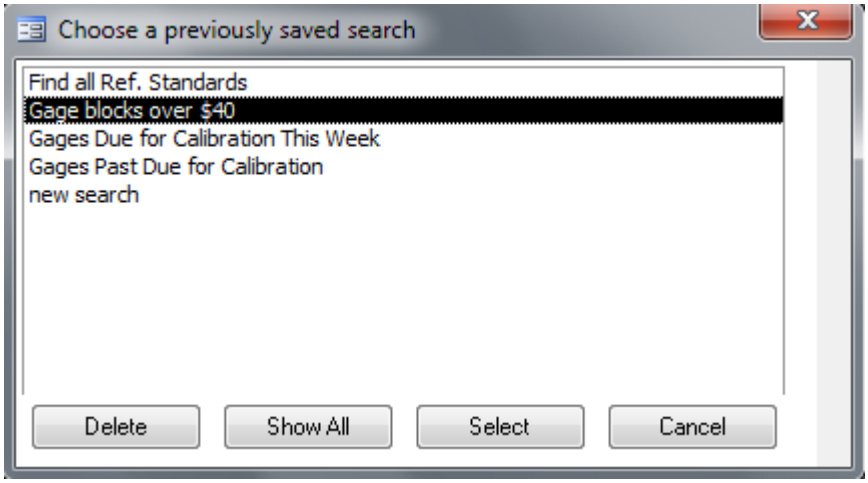


Enter a name for your search and click **OK** to save the search. Your filtered records will be displayed:



Notice at the bottom of the window shown above that the record navigation bar shows that this is record 1 of 1 (Filtered).

To access a saved search, click the **Advanced Filter** icon and click **Open Search**. A list of your saved searches will be displayed:



Click the name of the search you want to open and click **Select**. Your filtered records will be displayed.

Removing Filters

After using either the Quick or Advanced Filters, click the **Show All Records** icon to undo the filter so you can view all of your records:

Printing of Records

You can print records in both Datasheet and Form Views. To do so, select Print from the **File** menu. You can also select **Print Setup** and **Print Preview** from the **File** menu. These commands, combined with the **Filter/Sort** command, will be useful when you're designing customized reports.

Find Command

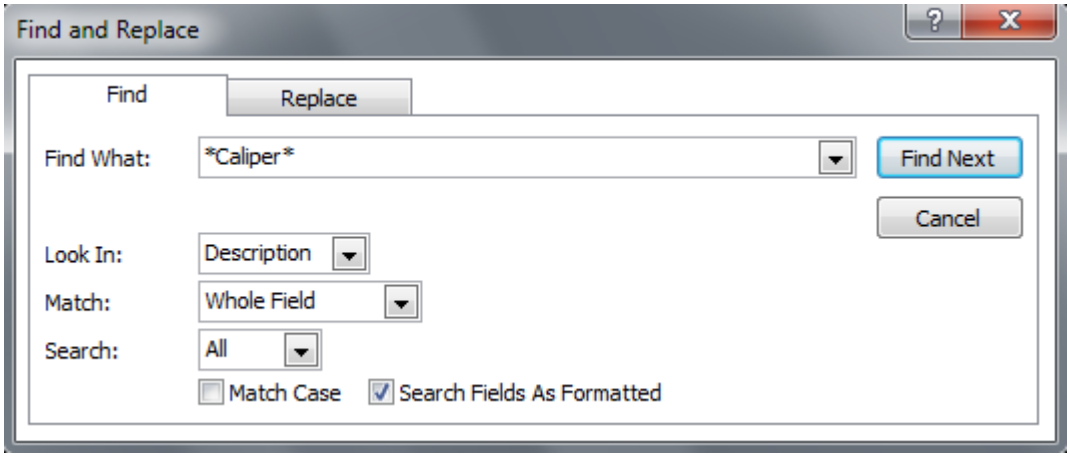
While you're in Form View or Datasheet View, you can go to **Edit -> Find** or click the **Find** icon to search through your records for specific information. For example, you could search the database for gages located in a certain department or for gages you purchased last year.

You can search for any text string, including a phrase, a word or part of a word. You can also use wildcard characters to make the search more general. For faster searches, search for the first few characters within a single field.

The **Find** box remains open during searches, so you can find as many records as you want without repeatedly selecting the **Find** command. If necessary, drag the **Find** box out of the way so that you can see your records.

To find data:

1. Display the table or form for the records you want to search.
2. Select the field (column) in which you want to search, unless you want to search in all fields. However, remember that searching a single field is faster than searching in all fields.
3. From the **Edit** menu, choose **Find** or click the **Find** icon. The **Find** window appears.
4. In the Find What box, type the text you want to find. Use wildcard characters (such as "*"and "?") to make your search more general:



5. Set other **Find** dialog box options, if necessary, i.e., **Match Case**.
6. To find the first or the next occurrence of the text, click the **Find Next** button.
7. When you're finished, close the form by clicking the X at the top right corner of form.

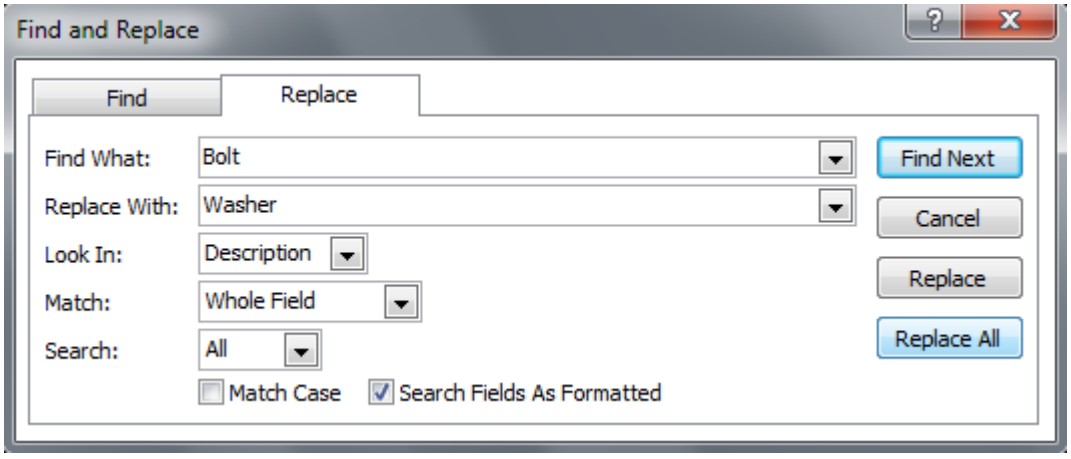
Replace Command

While you're in either Form or Datasheet View, the **Replace** command is available via the **Edit** menu or by clicking the **Replace** icon. Within a database table, you can search for and replace all or some occurrences of a specified text string, including a phrase, a word or part of a word. For

example, you might want to change all occurrences of the word Bolt to Washer in a part **Description** field.

To replace data:

1. Display the table or form containing the information you want to replace.
2. Select the field (column) in which you want to replace data, unless you intend to search all fields.
3. Call the **Replace** command.
4. In the **Find What** field, type the text you want to find. Use wildcard characters to make your search more general. If you use wildcard characters, you might want to confirm text replacements to ensure that they're correct (see below).
5. In the **Replace With** field, type the replacement text.
6. From the **Search** drop-down list, select Up, Down or All fields. If you select Up, the program searches for data from current record to the beginning of the database. If you select Down in the program searches for data after the current record selection. If All is selected, the search includes a search on the entire database.
7. Set other **Replace** dialog box options if necessary.



You can confirm each replacement, or you can replace all occurrences without confirmation:
To confirm each replacement:

1. Click the **Find Next** button to find the first occurrence of the text. The program locates and highlights the first occurrence of the text.
2. Click the **Replace** button to replace the highlighted text with the text in the **Replace With** box. If you don't want to replace this occurrence of the text, click the **Find Next** button to locate the next occurrence.

To replace all occurrences without confirmation:

1. Click the **Replace All** button.

Quick Sort Command

You can use the Quick Sort command from the Records menu to perform a simple sort of your records, based on the currently selected field(s). When you select this command, you'll see a submenu that enables you to sort in ascending or descending order (see below). The sorted records return to their original order when you close the form (or table).

Ascending: A–Z or 0–100
Descending: Z–A or 100–0

Output To Command

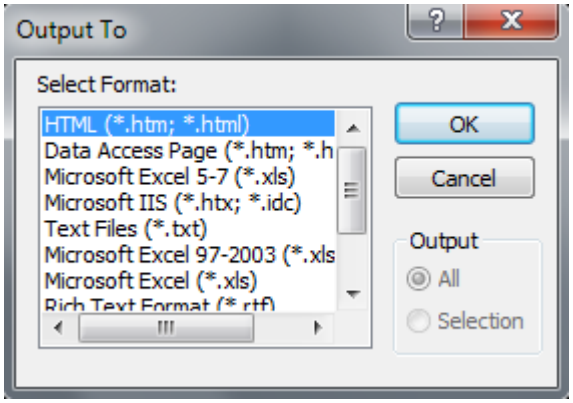
The **Output To** command for records from the **File** menu allows you to transmit records to Rich Text Format (*.RTF), MS-DOS Text (*.TXT), Microsoft IIS (*HTX; .IDC), Microsoft Excel (*.XLS), Microsoft Active Server Pages (*.ASP) and HTML (*.HTM; *.HTML).

If you save a record in .RTF format and then open that record file in a word processing application, such as Microsoft Word, your data will have the appearance and formatting of the GAGEtrak datasheet that you exported.

If you output to a text file, all of the data will be present, but the formatting will be lost.

Output to -> Microsoft Excel is the best option to select when you wish to export records created from Datasheet View. See the description for **Output To** for reports under **Report Commands and Functions**.

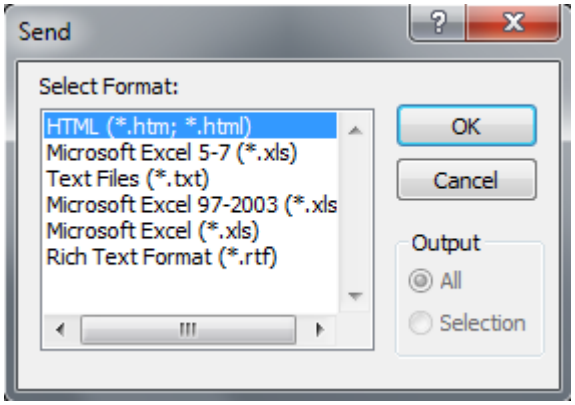
The following is an example of the output selections for the Gage Entry datasheet, (**Output All** and **Selection** options are not available with the **Output To** option):



Send Command

The **Send** command from the **File** menu allows you to send datasheets to Microsoft Outlook (or any MAPI compatible mail program). The output includes sub-forms and sub-reports. The file format and appearances are the same as those described above for the **Output To** command. See the description for the **Send Command** under **Report Commands and Functions**.

You can send GAGEtrak information in the following formats, (**Output All** and **Selection** options are not available with the **Send** option):



Select Record Command

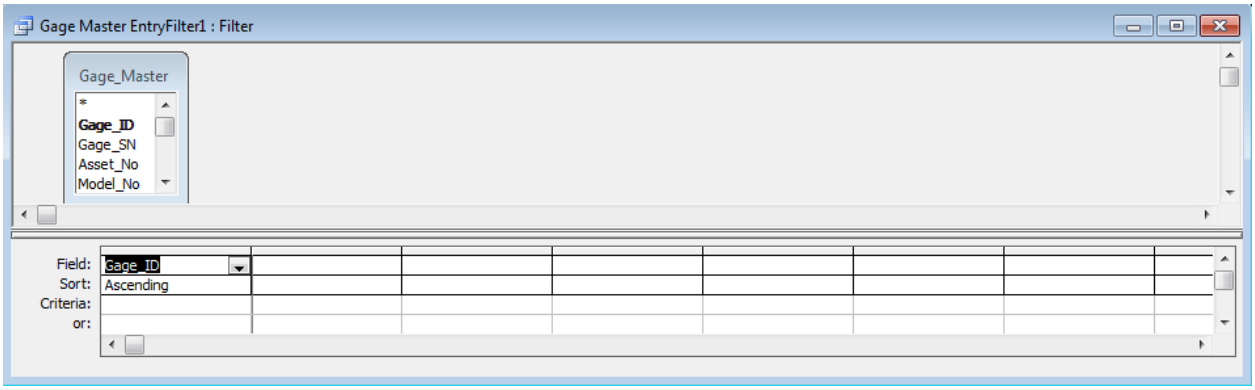
Use the **Select Record** command from the **Edit** menu to select (highlight) the current record, which allows you to work with it as a whole. For example, you can select a record you want to copy to the clipboard.

Select All Records Command

You can use the **Select All Records** command from the **Edit** menu to select (highlight) all open records so that you can work with them as a group. For example, you can select all the records in one table and copy them to a spreadsheet or word processing document.

Edit Filter / Sort

In addition to sorting, you can enter a criteria expression to find only those records that match your specific conditions. From the **Records** menu, select **Edit Filter/Sort**:



Enter criteria expressions into the **Criteria** cell row and, optionally, into the **or** cell row. If you're using field names in the criteria expression, choose only those fields displayed in the field list (you must spell the field names exactly as shown).

Examples

Field	If You Enter	GAGEtrak Will Find
Description	"Caliper"	Gages with the description "Caliper"
Description	"Caliper" Or "Micrometer"	Calipers or micrometers
NextDue	= #3/2/2009#	Gages due on March 2, 2009
NextDue	Between #3/1/2009# And #3/31/2009#	Gages due between the 1st and 31st of March, 2009
Current_Location	In ("QC Lab", "Receiving")	Gages located in the QC Lab or in Receiving
Current_Location	Not "QC Lab"	Gages that aren't located in the QC Lab
NextDue	< Date( )- 30	Gages overdue by more than 30 days; Date( ) represents the current date
NextDue	Year([Order Date]) =	Gages due in 2009

	2009	
NextDue	DatePart("q", [Next Due Date]) = 4	Gages due in the fourth calendar quarter
Description	Like "C*"	Gages with descriptions that start with the letter C
Description	Like "[A-D]*"	Gages with descriptions that are between A and D
Gage_ID	Right([Gage ID],2) = "99"	Gage IDs that have "99" in the last two field positions
Description	Is Null	Gages with null (blank) descriptions
Description	Is Not Null	Gages with descriptions that aren't null (blank)

Adding New Records

To add new records in Form View, do one of the following:

1. Click the New Record icon in the toolbar .
2. Click the New Record navigation button .
3. Use the keyboard shortcut, CTRL +.

Enter the information into the record and then repeat any of the above steps to add another new record.

To add new records in Datasheet View, do one of the following:

1. Click the New Record icon in the toolbar .
2. Click the New Record navigation button .
3. Use the keyboard shortcut, CTRL +.
4. Scroll to the bottom (empty) row.

Each of the above options takes you to the bottom of the datasheet and activates the last row, which is always present for the addition of a new record. This blank row is marked with an asterisk:

	+	WT2	WEIGHT STD, 100 GRAMs, CLASS 3	☑	STANDARD	100 GRAMS	1/6/2003
	+	WT90	WEIGHT STD, 5000 GRAM, CLASS 3	☑	DIAL	5000 GRAM	9/8/2003
*				☐			

Enter the information into the record; repeat these steps to add another new record.

Go To Command

You can use the **Go To** command from the **Records** menu to quickly move to different records: first, last, next, previous and new.

Deleting Records

In Form View, go to the record you want to delete and click on the record's selector bar (or button). Then, choose **Delete** from the **Edit** menu, the **Delete Record** icon from the floating toolbar or press the Delete key on your keyboard. GAGEtrak will ask you to confirm the deletion (sometimes twice).

In Datasheet View, you can delete multiple records at once. Use the record selector buttons to select all the records that you want to delete and then choose **Delete** from the **Edit** menu, the **Delete Record** icon from the floating toolbar or press the Delete key on your keyboard. GAGEtrak will ask you to confirm the deletion (sometimes twice).

Undo Changes to Fields and Records

If you want to undo changes to a field (and you haven't left the field), either press the ESC key or select Undo command from the Edit menu.

If you change more than one field on a record and want to remove those changes, select **Edit -> Undo Current Record**. This will Undo all changes made to the entire record.

Saving Records

GAGEtrak automatically saves records whenever you go to a different record or close the window, but you can manually save records by clicking the record selector bar (or selector button in Datasheet View). You can also use **Save Record** from the **File** menu to save your records.

Editing and Shortcut Keys

You can use these keyboard shortcuts to save time when you're entering records.

Note: Where indicated by CTRL, press the CTRL key while pressing the other key.

Keyboard Shortcuts - General

Press	To
PAGE DOWN	Go to next record in Form view (next page of records in Table view)
PAGE UP	Go to prior record in Form view (prior page of records in Table view)
CTRL PAGE DOWN	Go to next record, but keep cursor in same field
CTRL PAGE UP	Go to prior record, but keep cursor in same field
CTRL '	Copy field data from the prior record's field
CTRL ;	Insert the current date
CTRL :	Insert the current time
CTRL +	Add a new record
SHIFT ENTER	Save changes to the current record
CTRL -	Delete the current record
CTRL ENTER	Add a new line to a memo field
F2	Switch between field editing and navigation modes
F5	Move to the record number entry box
SHIFT SPACE	Select the current record

Field Editing and Selection Keys

Press	To
SHIFT RGT ARROW	Extend the selection or deselect one character to the right
CTRL SHIFT RGT ARROW	Extend the selection or deselect one word to the right
SHIFT LFT ARROW	Extend the selection or deselect one character to the left
CTRL SHIFT LFT ARROW	Extend the selection or deselect one word to the left
CTRL C or CTRL INSERT	Copy the selection into Windows Clipboard
CTRL V or SHIFT INSERT	Paste text from Windows Clipboard

Datasheet (Table) Keyboard Shortcuts

Press	To
TAB, ENTER or RGT ARROW	Move to the next field
END	Move to the last field in the current record (Table view)
SHIFT TAB or LFT ARROW	Move to the previous field
HOME	Move to the first field in the current record (Table view)
DN ARROW	Move to the current field in the next record
CTRL DN ARROW	Move to the current field in the last record
CTRL END	Move to the last field in the last record
UP ARROW	Move to the current field in the previous record
CTRL UP ARROW	Move to the current field in the first record
CTRL HOME	Move to the first field in the first record

Menus and Commands

The following is a summary of the various menus available from the menu bar, including explanations of the available commands in each.

File Menu

Command	Description
Close	Use this command to close the current screen and return to the prior screen.
Save Record	To save the current record, choose File | Save Record.
Output To...	Select this command to output the current record(s) to an Excel spreadsheet, word processing .RTF, or ASCII text file.
Print Setup	Choose File | Print Setup to define your printer and settings.
Print Preview	To see the current record as it would look if printed, select this command.
Print	This command prints the current record (performs like a screen dump).
Send	Use File | Send to e-mail the report (if you have MAPI compliant e-mail).
Last Gages	Lists the last 10 gages that a user accessed. Note: Gages are added to the list when the user edits a gage record, uses Find to access a gage record, or clicks any button on the Gage form. When the list exceeds ten (10) records, the first record will be eliminated, and if the user selects a gage record from the list of ten records the form will automatically find and display that record gage.
Exit	To quit GAGEtrak, choose File | Exit.

Edit Menu

Command	Description
Undo (CTRL-Z)	Choose this command to remove editing in fields and records.
Cut (CTRL-X)	Select Edit | Cut to remove the selected text from a field or a selected record, (a copy is placed in the Clipboard).
Copy (CTRL-C)	To copy the selected text or record into the Clipboard, choose Edit | Copy.
Paste (CTRL-V)	This command is active only when you cut or copy something— use it to paste the cut or copied text at the location of your cursor.
Delete	Choose Edit | Delete to either delete the selected text from a field or to delete a record (select the record first).
Select Record	Use this command to place the current record in a selected state for copying, deleting or printing.
Select All Records	To select all records for copying, deleting or printing.
Find	Select this command to search for a record based on the current field.
Replace	To perform a Find and Replace operation from the field in which your cursor is located.

View Menu

Command	Description
Form	Choose this command to see the record in Form view.
Datasheet	To see records in Datasheet view, select this command.

Format Menu

These commands are active only in Datasheet view.

Command	Description
Font	Use this command to change the Table view font (doesn't affect Form view).
Row Height	To change the height of all rows, select Format | Row Height.
Column Width	Select Format | Column Width to adjust the width of the selected column(s).
Hide Current Column	To hide the selected column, choose this command.
Show/Hide All Columns	Use this command to show or hide all or several columns.
Freeze Columns	You can use this command when you want to freeze the current column so that it is always visible, even when you're scrolling to the right.
Unfreeze Columns	To release any frozen column(s), choose Format | Unfreeze Columns.
Gridlines	Use this command to display or hide the horizontal or vertical gridlines.

Record Menu

Command	Description
Go To	This feature allows you to navigate to first, last, next or previous records. The New Record option will automatically create a new record.
Quick Sort	Use this command to quickly sort by the currently selected field(s) by either ascending (A-Z) or descending (Z-A) order.
Quick Filter	Use this command when you need to quickly find records based on a simple search. In addition to sorting, you can enter a criteria expression to find only those records that match your specific conditions.
Advanced Filter	Use this command when you need to find a particular record or group of records. This command lets you search on any field or combination of fields in a form.
Edit Filter/Sort	This feature allows a user to setup specific filter/sort queries.
Show All Records	Choose this command to disable any previous filters and see all records.

Bookmarks Menu

Command	Description
Add to Bookmarks	Allows a user to create a quick go to for the currently viewed gage by placing the gage ID with in the Bookmarks tree and or within a particular folder.

Manage Bookmarks	This feature is similar to a card rolodex, in which folders can be created to hold various gage information. Items within the Bookmarks tree can be dragged and dropped within the tree structure and or Renamed or Deleted.

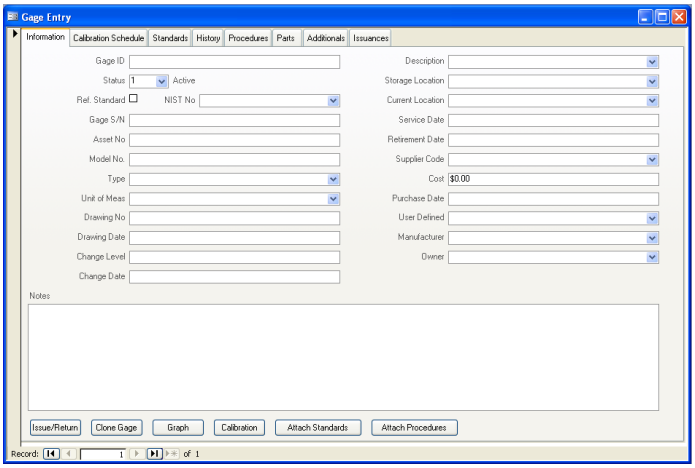
Help Menu

Command	Description
Contents	To see the Help file's table of contents, choose Help -> Contents.
Tip of the Day	View a useful procedure or performance tip.
About	Select this command if you want to see information about the program.

Chapter 3: Entering Gage Records

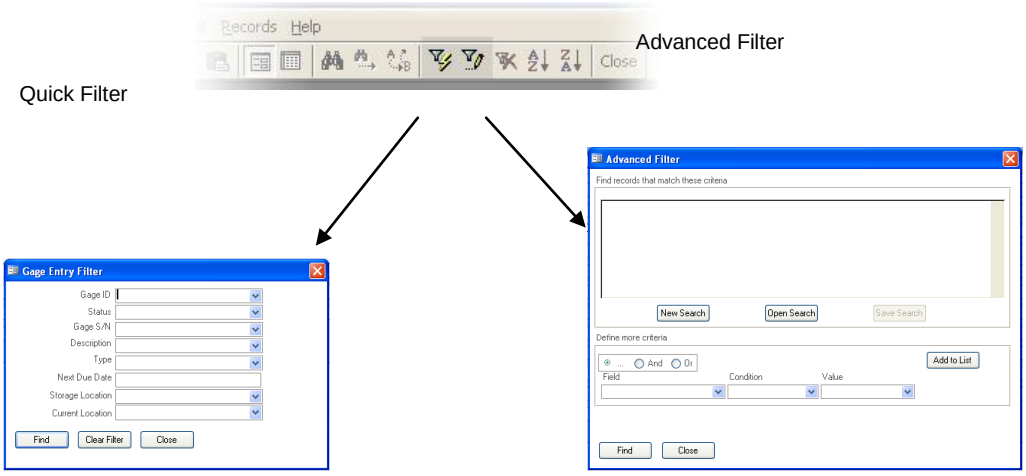
Gage Entry

To begin entering your gage records, select Gage Entry from the Main Records menu. The window below will appear:



Since you don't have any gage records entered yet, the fields are blank. After you enter your gage records, you can use the **Quick or Advanced Filters** to narrow your record

searches. Click the Find button to go to the gage record window. A more detailed discussion of filters can be found in *Program Conventions*.



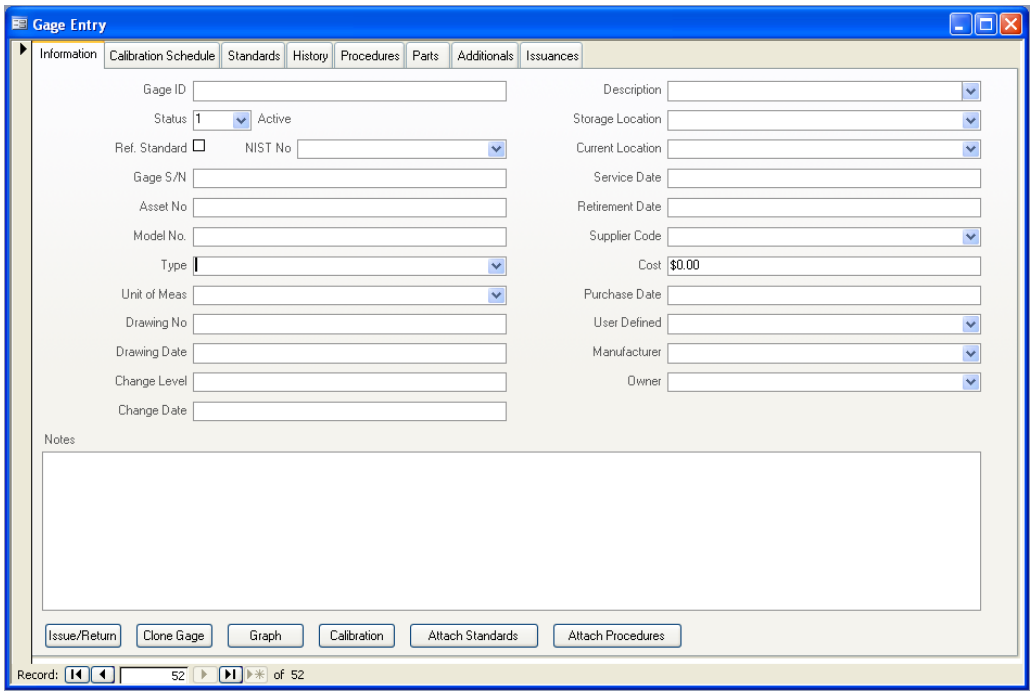
Searching or Filtering Records

If you want to search for a particular gage and don't know its ID, then select the *list box* button (it has a downward pointing arrow) next to the Gage ID field. A list of all available gages, showing both gage ID and description, will appear. Similarly, for the other fields, you can select from the list box if one is available, or type in information that applies only to the particular gage(s) you want to find.

In any of the list box fields, after you type in one or two characters, the first option that begins with those characters will appear in the field. To save time, if this is the selection you want, you can instantly go to the next field instead of entering the rest of the characters.

If there is filter criteria in the Quick Filter and you don't want to enter any filter information select the Clear Filter button and click the Find button. GAGEtrak will present *all* of your gage records. At first, you'll probably use this method more than the search options.

Gage Entry—Information



To enter a new gage record, click the New Record button (it looks like a blank sheet of paper) on the floating toolbar or click the New Record button at the bottom of the screen.

Use your mouse cursor (or TAB key) to move between the available fields in the gage record window. Press the F2 key to edit existing field information.

Gage Entry–Information records contain the following fields:

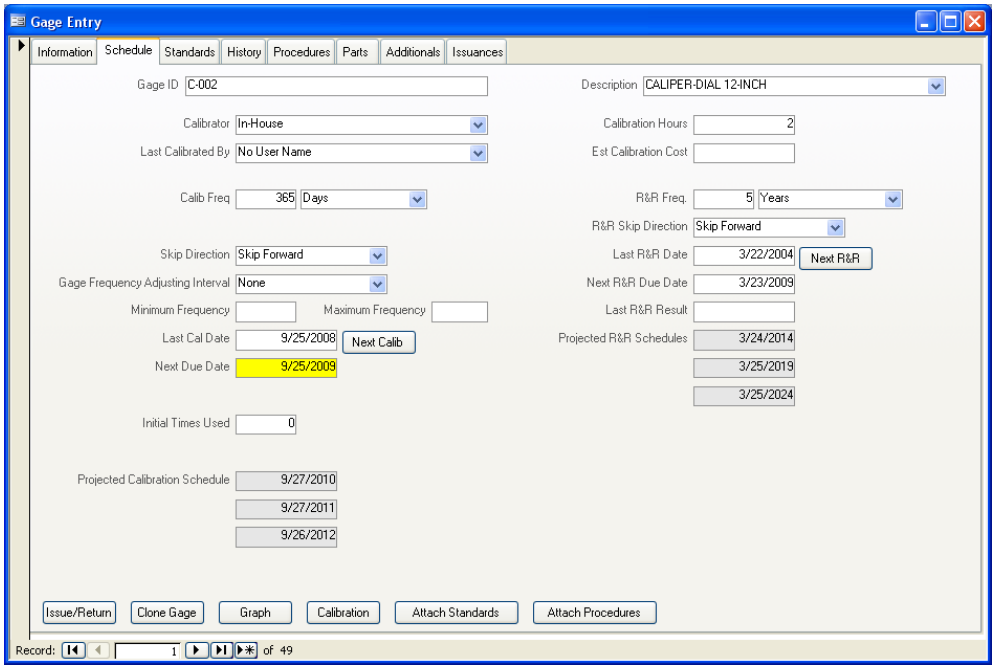
Field/Button Name	Description
Gage ID	In this field, enter a *unique* alphanumeric identification code for each gage. In order to save the gage record, you must enter an ID. For consistency and efficiency, you'll need to develop your own gage ID numbering system. **Tip: Avoid using the characters #, *, ! and ? in your gage IDs or other fields, as these are considered wildcard characters in GAGEtrak. It is also recommended that you do not use " or ', for gage IDs. If you must use these characters, such as in "Gage #1", then you must place brackets around the wildcard character whenever you want to search or filter your records; for example, you would enter** `Gage [#]1`. **For more information about wildcards, please see the *Program Conventions* section of the *User's Manual*.**

Field/Button Name	Description
Status	Use the list box to pick from your available choices (for example, `1-Active`). This field is required. To add more choices to the *Status* field, go to the Setup menu and select Status ID Entry (see the *System Administrator's Guide* for more information). **Tip: If the** Status **field is *not* set to** `Active`**, the** Calibration Due **and** Calibration Schedule **reports will skip over the gage.**
Ref. Standard	Check this box to indicate that the record is for a calibration reference standard (such as a gage block or reference weight), not a gage.
NIST No.	For reference standards only, enter the number that NIST (National Institute of Standards and Technology) provides for traceability purposes. If it's not marked on the reference standard, ask your supplier for the number.
Gage S/N	Enter the actual gage manufacturer's serial number (found on most gages).
Asset No.	In this field, enter the gage's asset number (usually issued by your accounting department).
Model No.	Use this field to store the model number of this gage.
Type	This field is a list box field from which you can choose or enter a classification of the type of gage (such as Variable, Attribute, Dial, Vernier, Hard, Digital, or SPC).
Unit of Meas.	Enter the actual units that the gage measures in (such as In, mm, N, LBf, LBm, Ohms, or mA). This field is a list box in which more choices will be available as you add them for other gage records.
Drawing No. and Drawing Date	If applicable, enter the gage drawing number and date of the original drawing (usually for custom-designed gages, fixtures, or templates). Otherwise, use this field to store other information.
Change Level and Change Date	Enter the current change level ID of the current gage drawing and the date of the most recent drawing change level.
Notes	Use this field to store any comments about the gage.
Description	Enter a brief, but informative, description of the gage.
Storage Location	Enter the gage's storage or usual location (for example, Tool Crib–Bin 12).
Current Location	This field contains the gage's current location (such as Assembly Dept.).
Service Date	Enter the date on which you first started using the gage.
Retirement Date	In this field, enter the expected or actual date on which you stop using the gage. Usually this date is at the end of the gage's useful service life (typically 5-10 years) or at the expected date of major overhaul or maintenance.
Supplier Code	This field contains the supplier code or name of the gage supplier. If you plan to use GAGEtrak's supplier records, enter the supplier ID code in this field—not the supplier *name*. The drop-down list box for this field contains information that you entered in Supplier Entry.
Cost	Enter the actual purchase price or build cost of the gage.
Purchase Date	In this field, enter the date on which you purchased or first used the gage.
User Defined	This field stores any other data you need to track.
Manufacturer	Select or enter the manufacturer of the gage (this field creates its own list as you enter different manufacturers, so you can later just select from the list).
Owner	This field also creates its own list as you enter different gage owners.

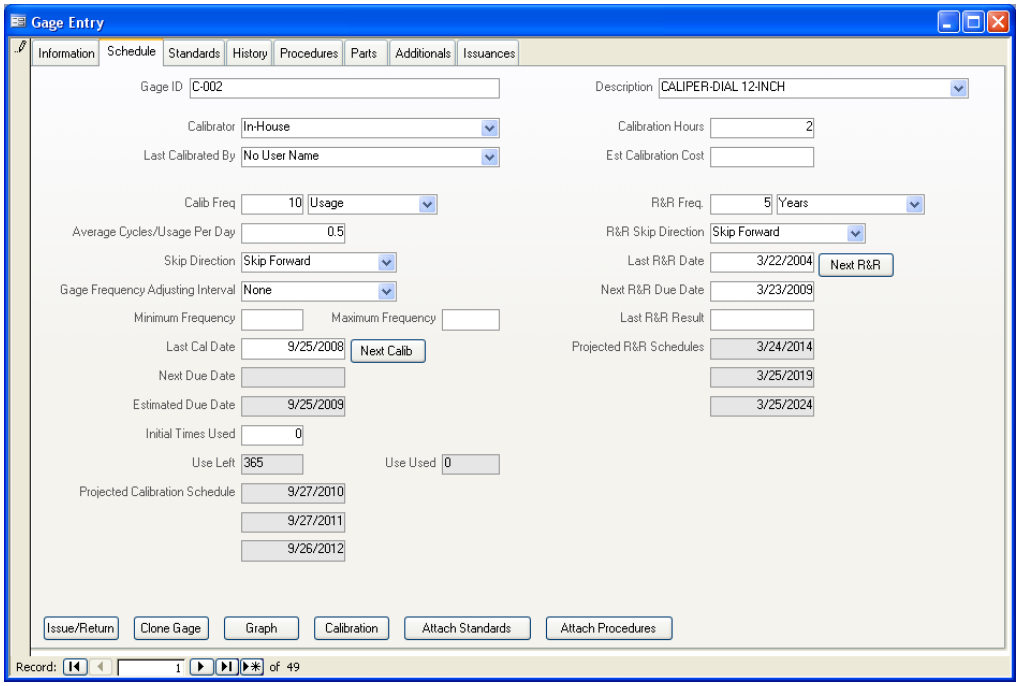
Field/Button Name	Description
Issue/Return Button	To loan this gage out and/or return it, click this button.
Clone Gage Button	Click *Clone Gage* to create a new record based on the current record.
Graph Button	If you want to see an accuracy chart for this gage, click Graph.
Calibration Button	To go to **Calibration Entry** for this gage, click this button. **Note: When you enter** Calibration Entry **via** Gage Entry **the calibration records presented will be of historical records for the particular gage ID record you were viewing in Gage Entry. In other words, if the user is in** Gage Entry **looking at the gage record for the Gage ID** C-002 **and selects the Calibration button, only the calibration records for** C-002 **will be visible. To create a new calibration record for the particular gage ID, select the new record icon button and or the new record button in the record navigator toward the bottom of the form.**
Attach Standards	Allows you to attach a Standard Group to the selected Group Type.
Attach Procedures	Allows you to attach a procedure to gages with the selected Gage Type.

Gage Entry—Schedule

In this screen, you'll set up the calibration schedules for each gage.



If `Usage` or `Cycles` is selected for Calib Freq the Calibration Schedule changes slightly, as shown below:



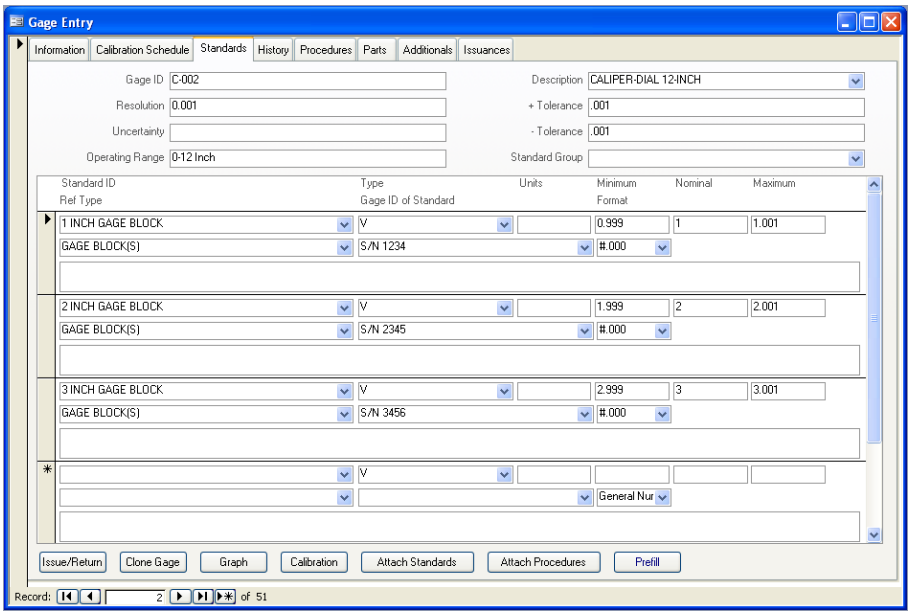
Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field
Description	The description of the selected gage will appear in this field
Calibrator	This field is a list box field from which you can enter or select the code for the supplier that normally calibrates the gage (the calibration service supplier). You can also set this field to `In-House` or a department or technician's name, if calibrated within your own facility (simply type the information into this field). Later, you can use this information to select a group of gages due for calibration by that calibrator. **Note: If you have the GAGEtrak PDA, you must enter a calibrator, since the PDA downloads calibrations by this field. For further information, see the GAGEtrak PDA Software User's Manual..**
Last Calibrated By	The name of the user who last calibrated the gage appears in this field.

Field/Button Name	Description
Calib. Freq. and Calib. Freq. Units	Enter how often the gage should be calibrated (such as "45 DAYS"). When GAGEtrak calculates the next calibration due date, it uses this value. The field located just to the right of the Calibration Frequency field is the Frequency Units field (it's not labeled). Use the list box button to choose the calibration schedule type. You can choose from these types: **Days—**the most common units; schedule is based on elapsed calendar days. **Weeks—**each week equals seven days; schedule is based on elapsed calendar weeks. **Months—**this option bases the schedule on months **DOM—**Day Of Month, allows you to set what day of the month the calibration will typically be due on. Set the calibration frequency to the number of months from the date of the last calibration. When you set the frequency unit to DOM, an unlabeled field will appear next to the unit control. Enter the day of the month that you want for the gage to be due on. For example, you wanted the calibration to be due on the 10th of the month six months from the time it was last calibrated, you would set the calibration frequency to 6, the unit of measure to DOM, and the day to 10. **Note:** DOM uses the skip dates and skip days feature, so the gage may not always be due exactly on the day set. If you enter a day that is not in every month, such as 31, then the application will use the last day of the month for months with only 30 days. **EOM—**the calculated Next Due Date changes to End of Month in which the Calc Next Due Date occurred. For example, `6 EOM` means every 6 months, but the program extends the Next Due Date to the end of the sixth month. If you're using skip dates (see the *System Administrator's Guide*), GAGEtrak schedules the Next Due Date on the last working day of the month. **Years—**each year equals 365 days; schedule is based on elapsed calendar years. **Each Use**—select this option if you calibrate the gage *before or after each use*; you must manually enter your due dates. **Usage**— when using this schedule, the program won't create a next due date for calibration. It will however, create an estimated due date based on the gage usage, even if you enter a calibration record for the gage. When you issue the gage, GAGEtrak calculates a predicted estimated due date based on the remaining number of usages days. You must use the Issue Tracking records for this to work. **Cycles—**similar in principle to the usage days method, but schedules calibration only when the total number of *cycles* equals or exceeds the *Frequency* value ("cycles" means either the number of *parts measured* or number of *cycles operated*). You must use **Issue Tracking** records in order for this schedule type to work. **Note: When calibration frequency is set to either Usage or Cycles the Calibration Schedule form changes appearance in order to accommodate Average Cycles/Usages Per Day, and an Estimated Due Date fields.**

Field/Button Name	Description
	Bef. Use—select this option when you must calibrate the gage *before* every use. GAGEtrak *will not* automatically calculate calibration due dates for this frequency; you must manually enter your due dates. **Aft. Use—**select this option when you must calibrate the gage *after* each use. GAGEtrak *will not* automatically calculate calibration due dates for this frequency—you must manually enter the due dates.
Average Cycles/Usage Per Day	This field is used for Usage and cycle gages only . Usage cannot be greater than one. It is used to calculate the estimated due date based on Issue/Return
Skip Direction	If the calibration date falls on a skip date, this determines whether to move the calibration date forward or backward. Select the default to use the skip direction setup in the Settings form.
Gage Frequency Adjusting Interval	If you want GAGEtrak to change this gage's calibration frequency according to its as found condition before calibration, make a selection from the Gage Frequency Adjusting Interval field. Based on your selection GAGEtrak will automatically adjust calibration frequencies based on the *A1* or *A3* method whenever you enter a new calibration record, according to the rules you defined in the Adjustment Calibration Frequency Setting tables. Please see the *System Administrator's Guide* for more information. **Tip: Do not make an adjusting method selection unless you fully understand this feature and decide that you want GAGEtrak to automatically adjust your calibration frequencies.**
Minimum Frequency	This is the minimum value that GAGEtrak can recommend for a calibration frequency interval. The default is 1, but you can change it according to the type of units you use, for example: perhaps 1 year is too long to be used as a minimum, and 1 day is too short.
Maximum Frequency	This is the maximum value that GAGEtrak can recommend for a calibration frequency interval. The default is 123, but you can change it according to the type of units you use, for example: 123 years is a long time.
Last Cal Date	When you first enter the gage record, enter the gage's last calibration date. Later, the program will automatically update this field whenever you add a new calibration record for the gage.
Next Due Date	This field shows the next calibration due date. It's automatically updated whenever you add a new calibration record for the gage (*Next Due Date = Calibration Date + Freq*). You can also manually enter any date into this field. If the current date is past the next due date, you'll see the message Past Due on the right of this date. **Tip: To calculate this date immediately, click the *Next Calib.* button (only if you've entered a calibration frequency and last calibration date). Using this button, you can calculate the next due date even if you don't enter a calibration record for the gage.**
Estimated Due Date	This field is mainly for usage and cycles gages. Calculation is based on calibration frequency, average cycles per day, issue/return and calibration history
Initial Times Used	GAGEtrak counts how many Issue Tracking records the gage has and adds it to this field. The total is displayed as Cumulative Times Used at the top of the Issue Tracking Entry screen.
Use Left	This field displays the amount of usage or cycles' remaining before this gage is due for calibration. This field is only used if the gage has a Usage or Cycles calibration frequency and is not editable.

Field/Button Name	Description
Use Used	This field displays the amount of usage or cycles' that have been used since the last calibration of this gage. This field is only used if the gage has a Usage or Cycles calibration frequency and is not editable.
Projected Calibration Schedule	To the right of the calibration schedule, you'll see the next three anticipated calibration dates, which GAGEtrak calculates when you click *Next Calib.* When you add a new calibration record for the gage, GAGEtrak automatically updates these dates, based on the current frequency. **Note: If you're using the Auto Adjustment of Calibration Frequency feature, be aware that these dates do not take into account future adjustments of the calibration frequency (since GAGEtrak can't predict if future calibrations will pass or fail).**
Calibration Hours	Enter the actual (or estimated) time it takes to calibrate the gage.
Est Calibration Cost	Enter in this field an estimate of the calibration cost as to labor and other resources that were used
R&R Freq. and R&R Freq. Units	Enter the frequency of gage R&R studies (such as `6 MONTHS`). When the software calculates the next gage R&R study date, it uses this value. Use the field located on the right of the *R&R Frequency* field to select the *Frequency Units* (schedule type). Choose from these options: **Days—**the most common units; schedule is based on elapsed calendar days **Weeks—**each week equals seven days; schedule is based on elapsed calendar weeks **Months—**the schedule is based on months **Years—**each year equals 365 days; the schedule is based on elapsed calendar years
R&R Skip Direction	If the gage R & R date falls on a skip date, this determines whether to move the schedule date forward or backward. Default Skip will move the schedule date forward.
Last R&R Date	When you first enter the gage record, enter the gage's last R&R study date. As you add new R&R records for the gage, as long as you use an R&R Frequency value other than zero, GAGEtrak automatically updates this field.
Last R&R Result	This field shows the last gage R&R study results (usually this is the gage error GRR expressed as either a percentage of TV or a percentage of tolerance). Later, it will be automatically updated as you add new R&R records for the gage, as long as you enter an R&R Frequency value other than zero.
Next R&R Due Date	This field tracks the next gage R&R due date. GAGEtrak automatically updates it whenever you add a new R&R record for the gage or you can manually enter a date into this field. If the today's date is past the next due date, you'll see a Past Due message. **Tip: To calculate this date immediately, click the *Next R&R* button (only if you've entered an R&R frequency and a last R&R date).**
Next R&R Button	Click this button to calculate the Next R&R Date and three future R&R dates. You can use this button to calculate the Next R&R Date even if you don't enter an R&R study record for the gage.
Projected R & R Schedule	To the right of the Gage R&R fields, you can see the next three projected R&R dates. GAGEtrak calculates these dates when you click the Next R&R button, then updates them when you add a new R&R record for the gage.

Gage Entry—Standards



Calibration Standard Records

Use these records to define the list of standards or test parameters that are measured when this gage is calibrated. Later, when you enter a calibration record for the gage, GAGEtrak automatically copies this list to the calibration record. It sorts and displays your calibration standards in ascending order, based on the standard IDs. You can enter as many calibration standards as you need.

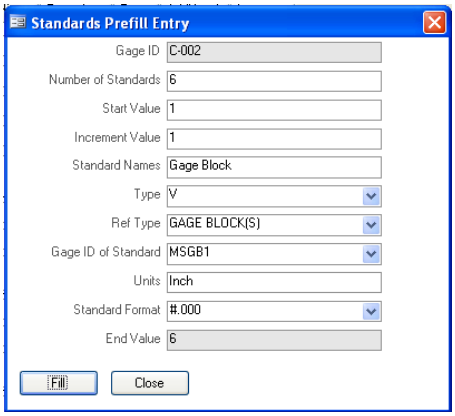
The Calibration Standards table contains these fields:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Resolution	Use this field to store the resolution of the gage. This is the smallest (or least count) unit of motion that the gage is capable of measuring and displaying. For example, 0.001 is the resolution on a typical dial caliper.
Uncertainty	This field holds the uncertainty value—use it only if this record is for a reference standard. You can obtain this value from the manufacturer. It's expressed in units, such as percentage (0.5%), proportion (0.005), or measurement units (0.0001 inch).
Operating Range	Enter the gage's allowable operating range as to the minimum and maximum size it could measure.
Description	The description of the selected gage will appear in this field

Field/Button Name	Description
+ Tolerance	Use this field to store the *upper* tolerance for the gage, as published by the manufacturer. GAGEtrak later uses this information to calculate the maximum value for calibration standards. To enter this value as a percentage of the nominal, enter the value followed by the percentage sign (for example, enter `1%`). **Tip: Check the placement of decimal points—for example, `1%` equals one percent; `.1%` equals one-tenth of a percent.**
- Tolerance	Enter the *lower* tolerance for this gage, as published by the manufacturer (use a positive value). GAGEtrak later uses this information to calculate the minimum value for calibration standards. To enter this value as a percentage of the nominal, enter the value followed by the percentage sign (for example, enter `1%`). **Tip: Check the placement of decimal points—for example, `1%` equals one percent; `.1%` equals one-tenth of a percent.**
Standard Group	This field contains the group of standards that the Gage uses. It helps to update standards for a number of gages at once as well as fill in standards for common gages. The standard also includes resolution, precision, plus/minus tolerance values
Standard ID	Enter the name or ID of the calibration standard or checkpoint (for example, `Gage Block`). Each standard ID that you enter for the gage must be unique. If you need to use the same name for multiple standards, number or letter each name. For example, if you're using `CMM Check` in more than one standard ID, number the name for each standard. Your IDs would look like this: `01. CMM Copheck`, `02. CMM Check`, `03. CMM Check`. This numbering also lets you control the list's sort order (the program automatically keeps the list in alphabetical order by the *Standard ID* value).
Type	Two types are available: Variable or Attribute. Select `Variable` for those standards that have a value that you actually measure (such as 0.502 inches). Select `Attribute` for pass/fail or visual types of checks. Selecting `Attribute` does not calculate accuracy of particular standard.
Units	Indicate the units being measured, such as inches, mm, or degrees.
Minimum	When you enter the nominal measurement, GAGEtrak automatically calculates the minimum measurement, based on the gage's –tolerance. This value is the minimum acceptable value for the gage when you measure this standard (for example, 0.999).
Nominal	Enter the nominal value for the gage when you measure this standard (for example, 1.000).
Maximum	When you enter the nominal measurement, GAGEtrak automatically calculates the maximum measurement, based on the gage's +tolerance. This value is the maximum acceptable value for the gage when you measure this standard (such as 1.001).
Ref Type	Select the type of Reference Standard that will be used for this standard. This list box will show the Gage Type of every reference standard in the database.
Gage ID of Standard	Select from a list of available standard IDs. The list is limited by the Ref Type field. An empty Ref Type field would show all available IDs.
Format	Select numerical format for measurement appearance on reports. **Note: The format does not affect how measurements are shown in forms, only in reports.**

Standards Prefill Entry

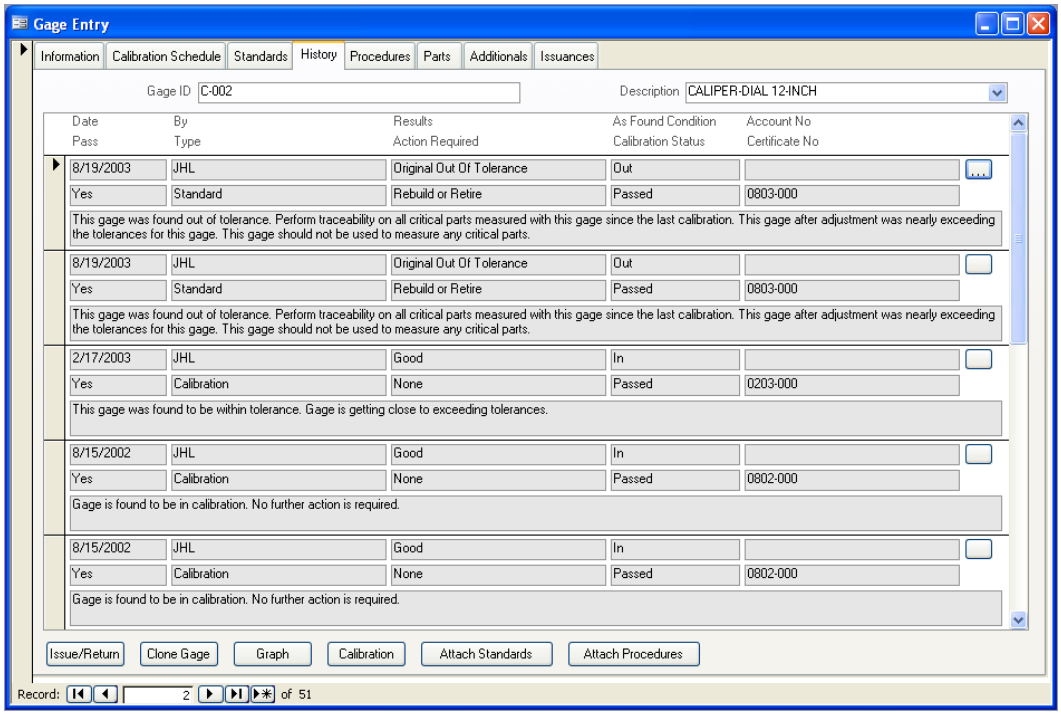
Use Standards Prefill Entry to save time when you have multiple calibration standards and their nominal values are evenly spaced (for example, if you have a group of standards with the values 1, 2, 3, 4, 5, and 6).



Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Number of Standards	In this field, enter the number of standards.
Start Value	Enter the smallest nominal value for the similar standards.
Increment Value	You can enter the difference between the sizes of the nominal values of the standards, such as .5 or .005, in this field.
Standard Names	Enter the part of the names that's the same for all of them. For example, let's say that you've entered `6` as your Number of Standards, and `1` as the Start Value. Also, you've chosen an Increment Value of `1`, with `Inch` as your Unit of Measure. If you enter `Gage Block` in this field, the resulting names for your standards will be `1. Gage Block (1 Inch)` and `2. Gage Block (2 Inch)`. **Tip:** If your number of standards is between one and nine, your standard ID names will be numbered like this: `1.Name`, `2.Name`. If you have from ten to 99 standards, their names will look like this: `01.Name`, `02.Name`.
Type	Select the type of standard: `Variable` or `Attribute`. Select `Variable` for those standards that have a value that you actually measure (such as 0.502 inches). Select `Attribute` for pass/fail or visual types of checks.
Ref Type	Select the type of Reference Standard that will be used for this standard. This list box will show the Gage Type of every reference standard in the database.
Gage ID of Standard	Select from a list of available standard IDs. The list is limited by the Ref Type field. An empty Ref Type field would show all available IDs.
Units	In this field, enter the unit of measure that the standards share.

Field/Button Name	Description
Standard Format	Select the numerical format that measurements will appear in on reports. **Note:** The format does not affect how measurements are shown in forms, only in reports.
End Value	GAGEtrak calculates the end value for you, depending on the Number of Standards, the Start Value, and the Increment Value.
Fill Button	After you've entered the information, click the Fill button, and GAGEtrak will fill in the information. The Minimum and Maximum values will be calculated from the – Tolerance and + Tolerance values.

Gage Entry—History


Gage Entry
Information
Calibration Schedule
Standards
History
Procedures
Parts
Additionals
Issuances
Gage ID C-002
Description CALIPER-DIAL 12-INCH
Date
Pass
By
Type
Results
Action Required
As Found Condition
Calibration Status
Account No
Certificate No
8/19/2003 JHL Original Out Of Tolerance Out
Yes Standard Rebuild or Retire Passed 0803-000
This gage was found out of tolerance. Perform traceability on all critical parts measured with this gage since the last calibration. This gage after adjustment was nearly exceeding the tolerances for this gage. This gage should not be used to measure any critical parts.
8/19/2003 JHL Original Out Of Tolerance Out
Yes Standard Rebuild or Retire Passed 0803-000
This gage was found out of tolerance. Perform traceability on all critical parts measured with this gage since the last calibration. This gage after adjustment was nearly exceeding the tolerances for this gage. This gage should not be used to measure any critical parts.
2/17/2003 JHL Good In
Yes Calibration None Passed 0203-000
This gage was found to be within tolerance. Gage is getting close to exceeding tolerances.
8/15/2002 JHL Good In
Yes Calibration None Passed 0802-000
Gage is found to be in calibration. No further action is required.
8/15/2002 JHL Good In
Yes Calibration None Passed 0802-000
Gage is found to be in calibration. No further action is required.
Issue/Return
Clone Gage
Graph
Calibration
Attach Standards
Attach Procedures
Record: 2 of 51

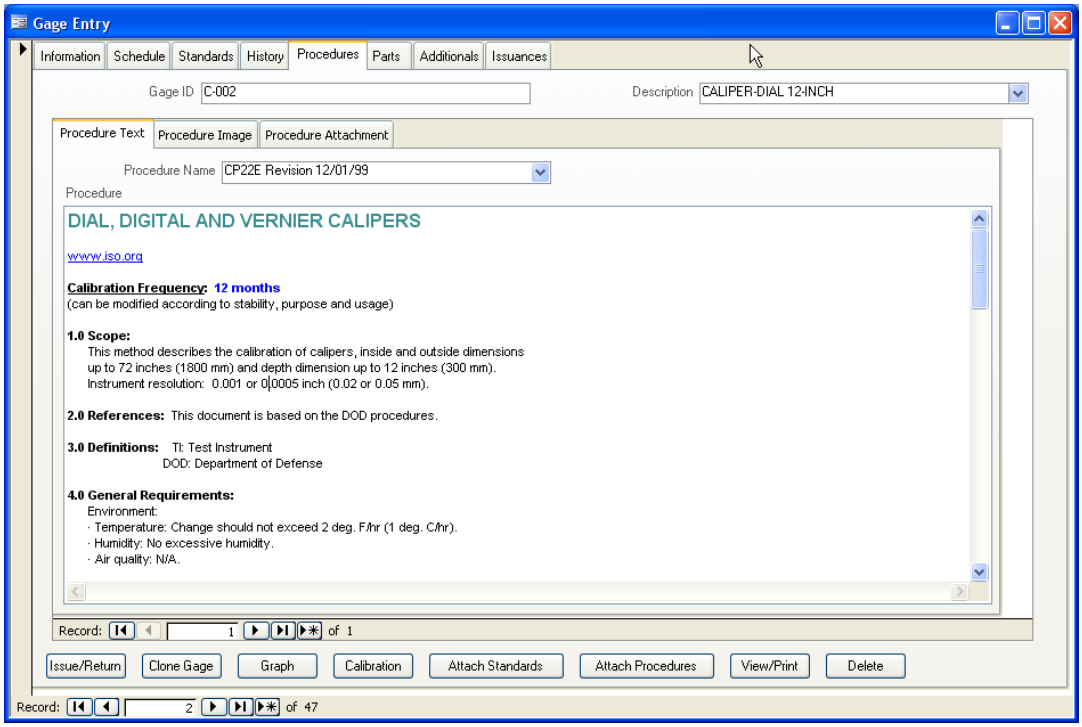
The History tab displays all calibration history for the selected gage ID. These records are sorted by date in *descending* order—this means that the most recent calibrations are at the top of the list. GAGEtrak pulls this information from the data you record in Calibration Entry.

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Description	The description of the selected gage will appear in this field
Date	This field shows the date for each calibration record.
By	In this field, you'll see the name of the user who performed the calibration.
Results	Any additional results recorded about the calibration will appear in this field.

As Found Condition	The condition of the gage before calibration or adjustment. `In` for in-tolerance, `Out` for out-of-tolerance, or `New` for a new instrument that has not been calibrated before.
Account No	An account number or other tracking number associated with the cost (examples include a job, purchase order, invoice, or customer number).
Drilldown Button	Select this button to view the Calibration Entry for this gage.
Pass	This field tells you whether each calibration was successful.
Type	A description of the type of calibration performed will appear in this field.
Action Required	Any action that may be required, such as "send out for repair".
Calibration Status	The final calibration status: Passed, Failed, Repaired, or Limited.
Certificate No	The certificate number issued by the outside calibration provider or your company.

Gage Entry—Procedures

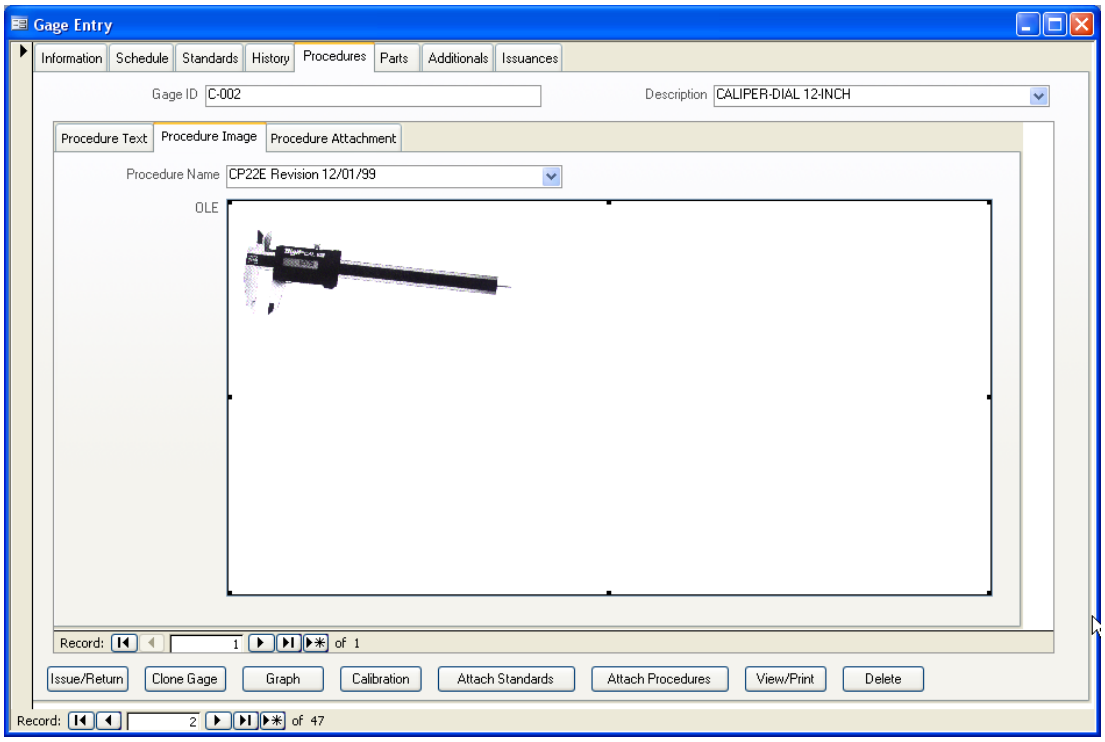
In the Gage Entry—Procedures screen, you can link calibration procedures to each gage. The Procedures screen has three additional tabs. The Procedure Text tab displays the text of the attached procedure and looks similar to the following



The table below describes the fields in this area:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Description	The description of the selected gage will appear in this field
Procedure Name	To link a calibration procedure to the current gage, select the procedure name from this list box.
Procedure	In this section, you'll see either the procedure text or any attached pictures.
View/Print Button	The Procedure text and the attached OLE image will open up in a new window for viewing/printing

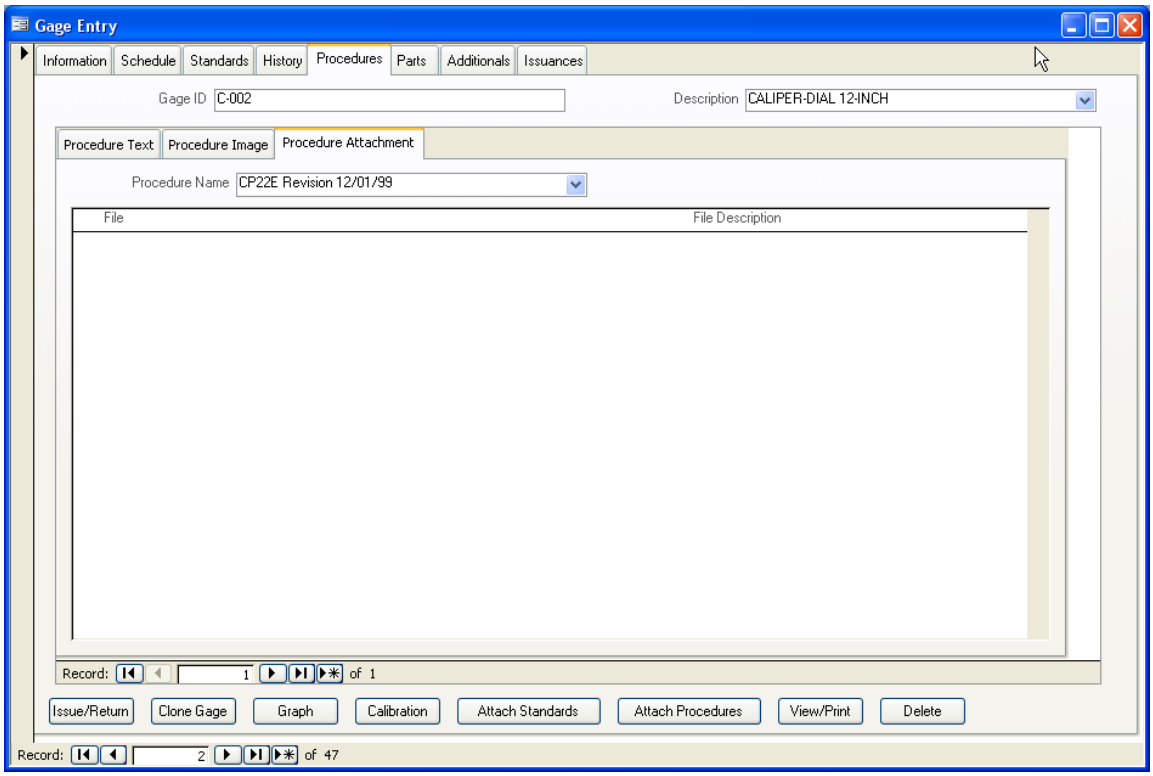
The Procedure Image tab holds any images associated with the procedure as shown below



The table below describes the fields in this area:

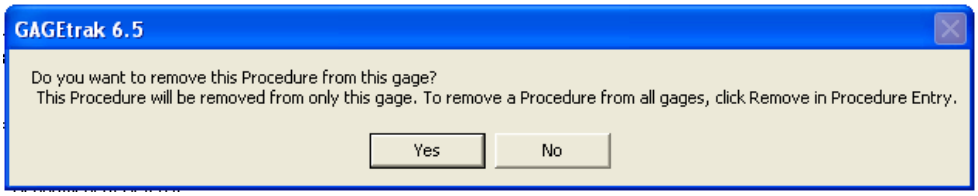
Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Description	The description of the selected gage will appear in this field
OLE	The image associated with the procedure is displayed in this field.
View/Print Button	The Procedure text and the attached OLE image will open up in a new window for viewing/printing

Finally, the Procedure Attachments tab displays any files attached to the Procedure. Please note that you will not be able to add any attachments to Procedures in this tab. Attaching or editing already attached files can only be done in Procedure entry. This tab is only for viewing and printing the attached files.



The table below describes the fields in this area:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Description	The description of the selected gage will appear in this field
File	Path of file attachment. **Note:** Verify that all users of this application have the ability to view the contents of this file. This includes both access to the directory where this file is stored and having sufficient network security rights to open this file.
File Description	Description of attached file type. For example, if the attached file is a Microsoft Word document the Description field will contain Microsoft Word Document.
View/Print button	Attachments associated with the current procedure can be selected from under Procedure Attachment and then by selecting this button.

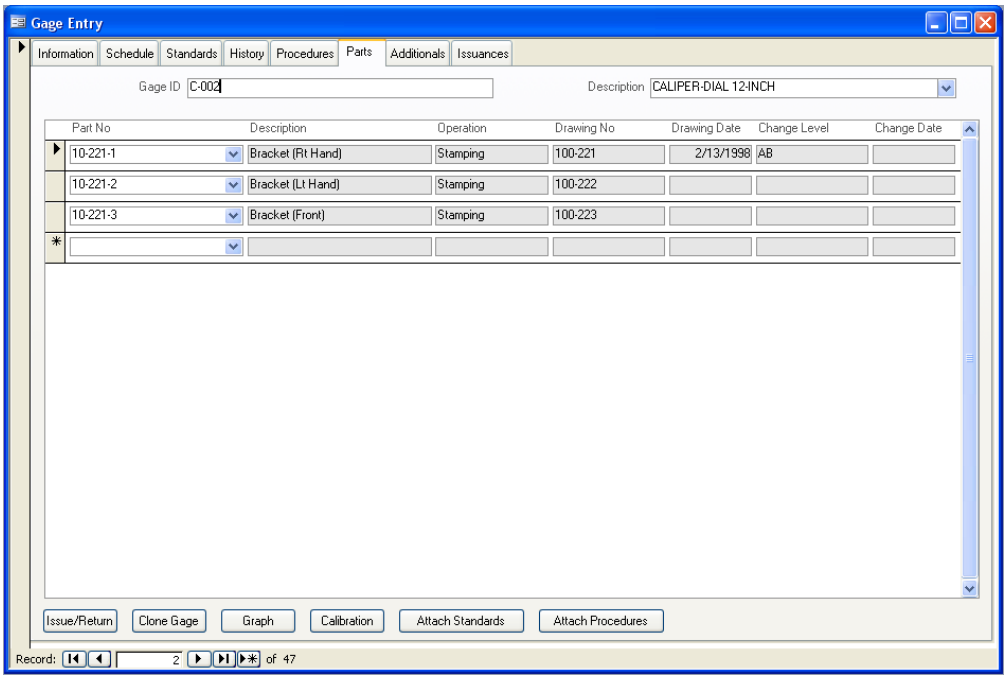
Field/Button Name	Description
Delete button	Click this button to remove the procedure from this gage. When you click this button, a dialog window will appear to tell you that, in Gage Entry, you can only remove the procedure from the current gage record. To remove the procedure, click Yes. If you want to delete or remove a procedure from all gages, you must do so in Procedure Entry. 

Adding Procedures

To link another calibration procedure to this gage, use the navigation buttons at the bottom of the Procedures window to add a new procedure record. Again, select the name of the procedure from the list box. You can choose only procedures that you've entered in Procedure Entry.

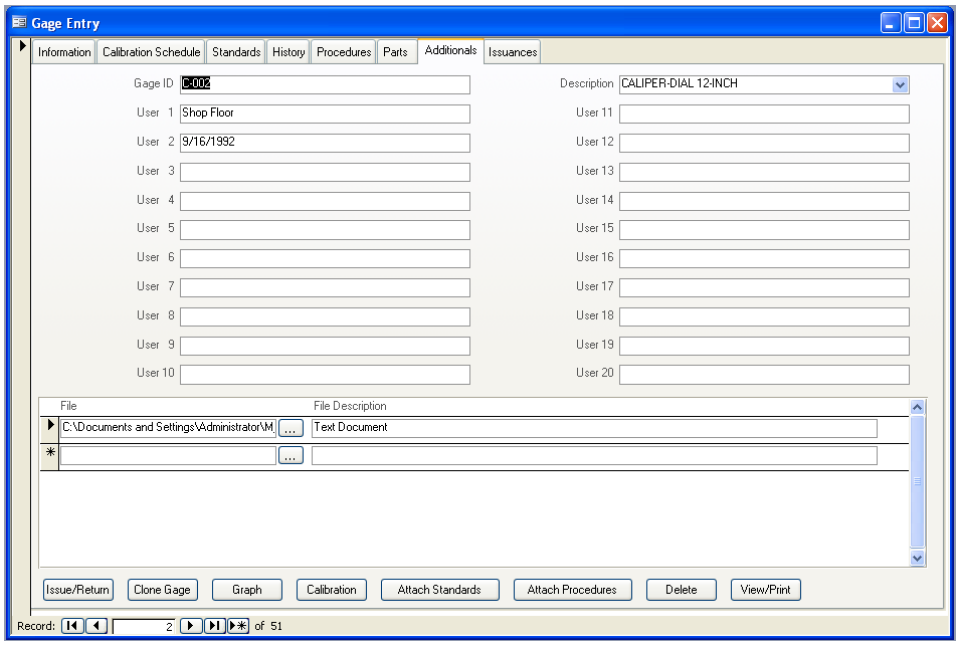
Gage Entry—Parts

Use these records to define the parts and operations for which you'll use the gage. By linking this information to each gage, you're facilitating manufacturing traceability. Before you can link a part to a gage, you must enter the part's record in Part Entry.



Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field
Description	The description of the selected gage will appear in this field
Part No.	Select the part's ID number. After you select the part number, GAGEtrak will fill in the other fields with the information that you entered in Part Entry. Part information on this form is read only.
Description	The name of the part will appear in this field.
Operation	This field stores the production operation or work center description (such as "`Stamping`" or "`Machine 13`").
Drawing No.	The blueprint drawing number of the part appears in this field.

Gage Entry—Additionals



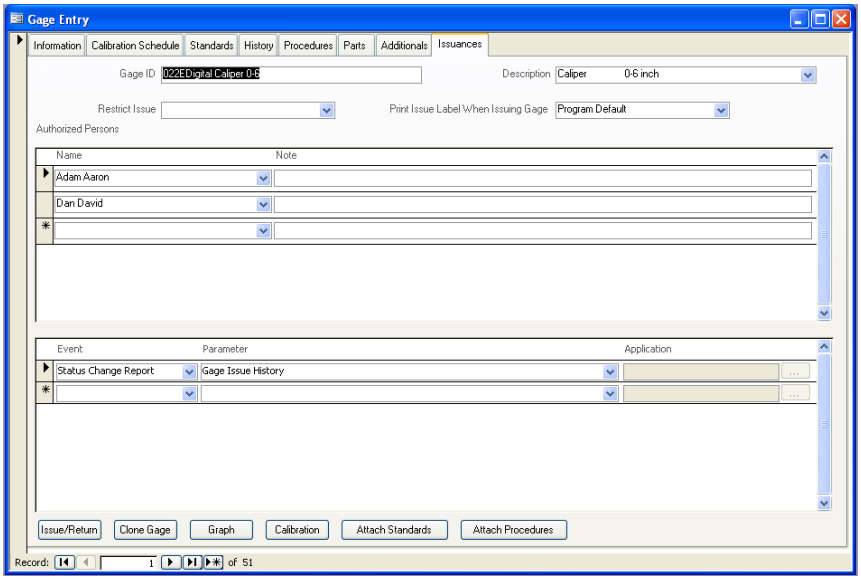
The table below describes the field in this area:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field
Description	The description of the selected gage will appear in this field
User Defined	These fields can be used to store additional information and can be customized, the label names changed, and the Data Types altered, in Setup – Settings – Interface – Gage Custom
File	Path of file attachment. Selection of files is made easier by selecting the drilldown button to the right of the file field that brings up a *Locate File To Attach* dialog box for file selection. **Note: Verify that all users of this application have the ability to view the contents of this file. This includes both access to the directory where this file is stored and having sufficient network security rights to open this file.**
File Description	Description of attached file type. For example, if the attached file is a Microsoft Word document the Description field will contain `Microsoft Word Document`.
Delete button	Highlight the record indicator to the left of the File name and or place the cursor in the File name field and select Delete from the floating toolbar to remove the attachment from the gage record.
View/Print Button	Select this button to open the selected file with that file type application.

Gage Entry—Issuances

This form can be used to record any authorized persons that are associated with a gage record.

Individual gages can have specific triggering events, for example a Gage Issuing Email, or if running of an external application if a calibration has failed. An external application can be an AutoCAD drawing or a Microsoft Excel spreadsheet.



The table below describes the fields in this area:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field
Description	The description of the selected gage will appear in this field
Restrict Issue	The option selections in this list box are Program Default, Restricted, and Not Restricted and control the persons authorized to Issue gages. If Program Default is selected the application will check whether or not Restrict Issue to Authorized User is checked in Settings – if it is the Issued To field in Issue Gages will list only the authorized users that were entered on the Gage Entry | Auth. Persons for that gage. Program Default is Restrict Issue the default. If Restrict Issue to Authorized is not checked, all staff will be listed in the Issue To in Issue Gages form. If Restricted is selected it will override the program default and the Issued To in Issue Gages will be restricted to the authorized persons for that specific gage. You will not be able to select this option until Authorized Persons have been added to the list. If Not Restricted is selected it will override the program default and the Issued To in Issue Gages will be populated with the staff list.

Field/Button Name	Description
Print Issue Label When Issuing Gage	Select Print Issue Label options include `Always Print, Never Print, Ask To Print,` or `Program Default`. Option selection made directly in Gage Entry | Specification will override the Program Default in Settings | Cal. Option which can be set to `Always Print, Never Print,` or `Ask To Print`.
Name	Authorized person's name.
Note	Information of person's affiliation with use of gage.
Event	List box of Events are actions taken within the system that trigger an occurrence, for example receipt of an email when a gage status has changed.
Parameter	If an email Event is selected, a recipient email address needs to be included in the parameter field. Replace `<send_to_email_address_here>` with a valid email server address. The preceding texts are defaults for the email subject and body identification. To include a revised Subject and body identifier for the email, follow the email address with a semicolon (;) and an email subject description.
Application	The Application drill down button can be used to load a file that needs to be run when an event is triggered. For example, a review of a comprehensive Microsoft Word document on a specific Calibration Procedure can be reviewed if a gage failed calibration. Additional gage events can be established in Setup – Gage Events.

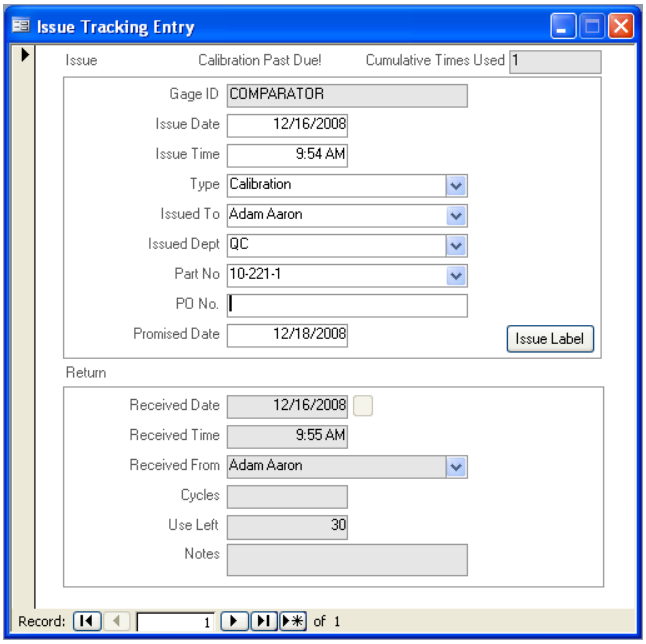
Using Gage Records

Issue/Return Tracking Records

When you need to issue a gage to a different location or department, you can record the issue in GAGEtrak. This feature is particularly useful in a gage crib situation, where gages and inspection equipment are loaned out and then returned for storage and safe-keeping. By tracking this information, you'll know which gages your company uses most often and which employees or departments use them.

To check out or return a gage, click the Issue/Return button at the bottom of the Gage Entry—Information screen. The Issue Tracking Entry screen will appear.

Tip: You can also issue and return gages by selecting **Issue Gages** and **Return Gages** from the **Main Records** menu. However, **Issue Gages** and **Return Gages** are designed for consecutive gage issues or returns (for large batches of gages) and to facilitate bar coded data entry. **Issue Tracking** is designed for issuing or returning a single gage.

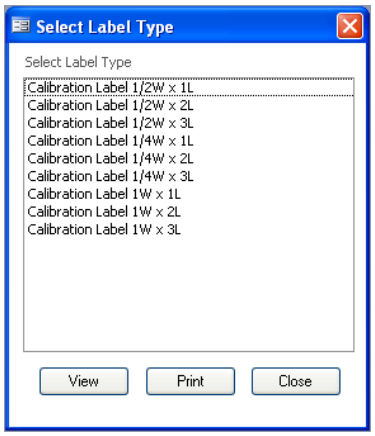


You must use Issue Tracking records for any gage whose calibration schedule is based on usage or cycles instead of elapsed calendar days. These records track usage days and operating cycles; they also update the next due date and or estimated due date of gages with these frequencies.

If you consistently use the Part No. field, you'll create manufacturing traceability. For example, if you find that a gage is out of tolerance, you can immediately generate a part recall report that lists all parts that you might have measured incorrectly.

The table below explains the fields and buttons in the Issue Tracking Entry screen.

Field/Button Name	**Description**
Issue Date and Issue Time	These fields track the date and time at which you issue the gage—the current date and time prefill the fields in which can be edited.
Type	Select the reason for issue; this field creates its own list from your entries.
Issued To	Enter or select a user from the dropdown list box of the person to whom you issue the gage. The name selection for this field will be dependent on the Gage Entry | Auth. Persons | Restrict Issue selection. For more information, see Restrict Issue under Gage Entry | Auth. Persons.
Issued Dept	Select or enter the department or job number that will use the gage.
Part No.	Use this field to track the part or group of parts that the gage will measure.
PO No.	You can enter a Purchase Order number if you're sending the gage out to a supplier for repair or calibration or are manufacturing parts for a customer.
Promised Date	Enter the date on which you expect the gage to be returned to you.

Field/Button Name	Description
Issue Label button	Click on this button to print an issue label for the gage being issued. **Note: A label printer must be installed to accommodate this request.** When you click on Issue Label, the Select Label Type window will appear:  Select an appropriate label size for the gage being issued. When you click on the View button you will be prompted to select a label printer; once you have done so, the Custom Report Editor will open to show you a preview of the selected label. Close the Custom Report Editor to return to Select Label Type; click Print to print the issue label or Close to close Select Label Type and return to Issue Label. The printed label shows the predicted Next Due date for a gage based on the frequency set for the gage, unless the frequency was set to `Usage` or `Cycles` then the Est Due date will appear on the label.
Received Date and Received Time	These fields track the date and time at which the gage was returned. Click the small button next to Received Date to insert the current date and time.
Received From	In this field, enter the name of the person who returned the gage.
Cycles	Enter the number of cycles performed by the gage (usually 1). GAGEtrak adds this number to any previous cycles for the gage. It uses that number to calculate the Next Due Date for gages that calibrated according to cycles.
Use Left	The value in the Use Left field is a decreasing value based on how many times you have left to use the gage before it is due for calibration.
Notes	Use this field for important comments, such as damages or malfunctions.

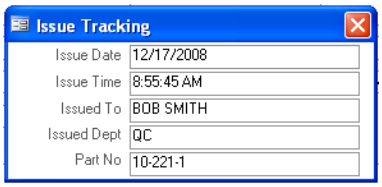
GAGEtrak uses the following rules to manage Issue Tracking records:

1. When you issue a gage, GAGEtrak inserts the current date and time as the issue date and time. It also changes the gage's Current Location field to a description that consists of Issued To plus Issued Dept. (For example, `Joe Jones/Assembly`).

2. GAGEtrak assumes you want to return a gage if its current record is incomplete. After you enter the Received Date and Time and save the record, GAGEtrak changes the gage's Current Location field to its storage location.

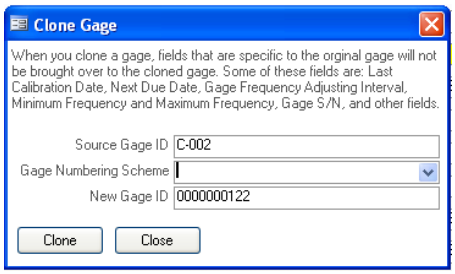
Pop-Up Issue Information

In the Gage Entry—Information tab, the Current Location field turns yellow to show that the gage is currently issued out. Double-click on this field to open a pop-up window that shows you the date, time, person, department, and part information from Issue Tracking. Double-click anywhere in the pop-up window to close it.



Cloning Gage Records

If you want to copy a particular gage record, *including* its set of calibration standards, procedures, and parts, click the Clone Gage button (located at the bottom of the Gage Entry window). This window will appear:


Clone Gage
When you clone a gage, fields that are specific to the orginal gage will not be brought over to the cloned gage. Some of these fields are: Last Calibration Date, Next Due Date, Gage Frequency Adjusting Interval, Minimum Frequency and Maximum Frequency, Gage S/N, and other fields.
Source Gage ID
C-002
Gage Numbering Scheme
New Gage ID
0000000122
Clone
Close

Enter a new gage ID directly into the New Gage ID field, or select a gage numbering scheme from the list box. If you select a gage numbering scheme, GAGEtrak will automatically input the next subsequent Gage ID for the New Gage ID based on the numbering scheme developed in the Setup | Settings | Automatic Numbering section), then click Clone. Click the Close button in the window's title bar when you're finished.

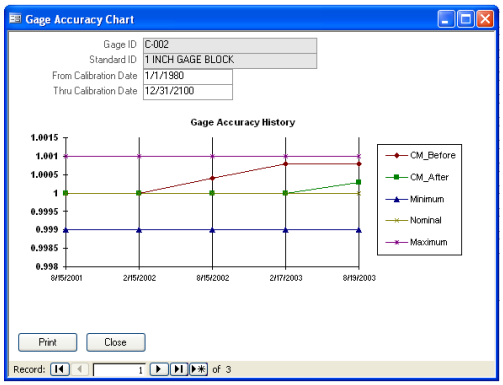
To clone more gage records based on the selected scheme, continue clicking the Clone button. Click the close button in the window's title bar when you're finished.

If you filtered for just one gage, when you're done cloning, GAGEtrak will show you the original gage record from which you created the clones. If you want to edit your cloned records, you'll have to re-filter and find them (to re-filter, click the toolbar button that looks like a funnel with a pencil).

A better way to clone gages is to re-filter and find **all** of your gages *before* you clone any of them (to re-filter, click the toolbar button that looks like a funnel with a lightning bolt). You can then use the Find (binoculars) button on the toolbar to find the gage(s) that you want to clone. If you use this method, when you're done cloning, GAGEtrak will show you the last cloned record that you created, and you can enter each clone's unique information.

Gage Entry—Graph Button

To generate an accuracy chart for the current gage record, click the Graph button in the Gage Entry—Information screen. By default, the program charts the entire calibration history for the first calibration standard. You can specify a time frame by entering beginning and ending dates in the From Calibration Date and Through Calibration Date fields.

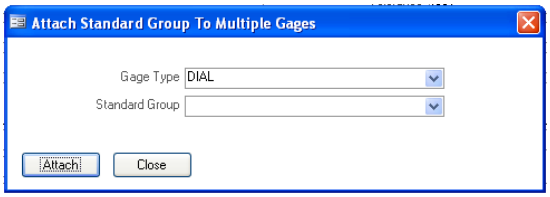


To view different standards, use the navigation arrow buttons (or press the PAGE DOWN/PAGE UP keys). Remember, you can generate this chart only after you've entered some calibration and measurement records (see the next chapter for more information on calibration records). As you can see in the sample screen, the chart plots *before* and *after* values, as well as the nominal, minimum, and maximum allowable limits. Click the Print button to print the graph or go to the File menu and select Print (the latter method lets you print multiple charts per page).

Gage Entry—Calibration Button

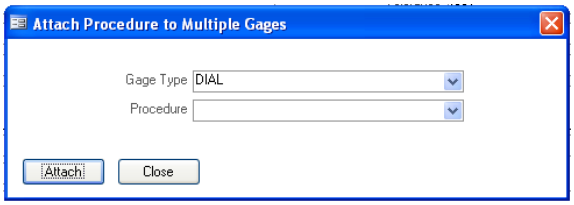
This button will take you directly to the Calibration Entry screen for the current gage ID. When you go to Calibration Entry from Gage Entry, you can see only the historical calibration records for the gage that you selected in Gage Entry. To create a new calibration record for the particular gage ID, select the new record icon button and or the new record button in the record navigator toward the bottom of the form. To return to Gage Entry from Calibration Entry, click Gage Entry or the close button in the window's title bar. For complete instructions for Calibration Entry, please see *Entering Calibration Records*. When you go to Calibration Entry from the main menu, you can choose from calibration records for all of your gages.

Gage Entry—Attach Standards Button



The Attach Standards button allows the user to attach a standard to a gage type for every gage ID with the same identification, for example Gage ID C-002. If there is an existing type already assigned to the gage and you try to attach a new standard group to this gage record, it will replace any previously attached standards that have the same standard ID as the new standard. For safety measures GAGEtrak will question whether you wish to continue with the new standard attachment.

Gage Entry—Attach Procedures Button



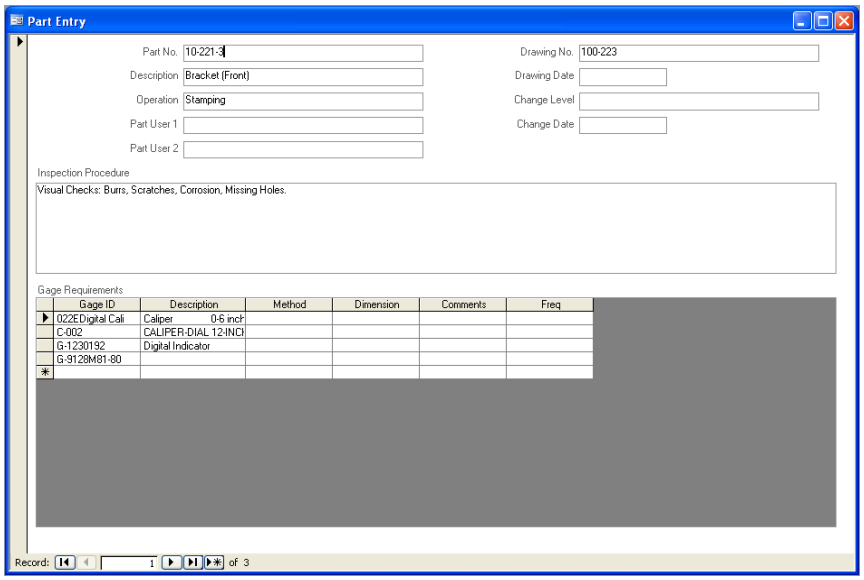
The Attach Procedures button allows the user to attach a procedure to a gage type for every gage ID with the same identification, for example Gage ID C-002. If there is an existing type already assigned to the gage and you try to attach a new procedure to this gage record, all gages with the selected gage type will have the selected procedure attached to

it. For safety measures GAGEtrak will question whether you wish to continue with the new procedure attachment.

Chapter 4: Part Records

Part Entry

Use Part Entry to track parts and set up lists of gage requirements (lists of gages that you need to use to inspect parts as you produce them). From the Main Records menu, select Part Entry.



Field/Button Name	Description
Part No.	In this field, enter the number of the part (use either the customer's or your internal part number).
Description	Enter the name of the part or a description that includes the name.
Operation	Use this field to track the production operation or work center description that uses or installs the part (such as `Stamping` or `Machine 13`).
Part User1 and 2	Use these fields to track additional information on the part.
Drawing No. and Drawing Date	Use these fields to record the blueprint drawing number and drawing date.
Change Level and Change Date	In these fields, enter the blueprint change level (also called engineering change level) and the change date.
Inspection Procedure	Enter instructions for checking the part.

Gage Requirements

Field/Button Name	Description
Gage ID	Select the Gage ID of the gage you will use to inspect the part.
Description	GAGEtrak will automatically enter the description of the gage you selected in the Gage ID field.
Method	Enter the control method, such as `Inspection Sheet` or `Control Chart`.
Dimension	In this field, enter the dimension or characteristic that you will check with the gage.
Comments	Record any notes about the dimension or characteristic that you're checking.
Freq.	Specify frequency in which the part will be inspected with this gage (such as `5 per Shift` or `10 per Day`).

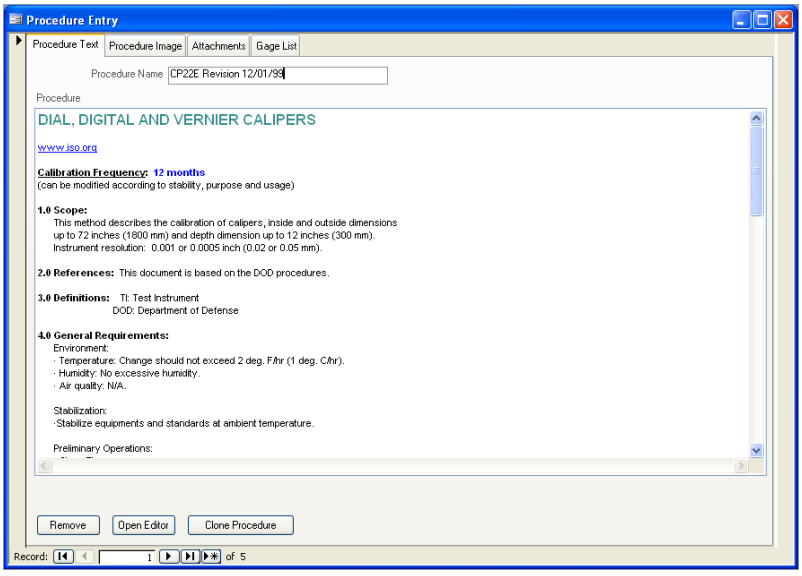
Chapter 5: Entering Procedure Records

Procedure Records

When you select Procedure Entry from the Main Records menu, the Procedure Entry window appears. It contains four different tabs: Procedure Text, Procedure Image, Attachments and Gage List.

Procedure Entry—Procedure Text

In this screen, you can copy or enter the text of each procedure. If Maintain Calibration Procedure History is set to true (checked), then the text of a specific procedure can be edited until it is used in a calibration record. Once it is added to a calibration record, the procedure is locked down so no changes can be made to it. If Maintain Calibration Procedure History is set to false (unchecked), then edits can be made any time even if the procedure is used in a calibration. To learn more about the Maintain Calibration Procedure History control see section “Settings – Cal. Option” of Chapter 4: Setting Up GAGEtrak in the Administrator Guide.

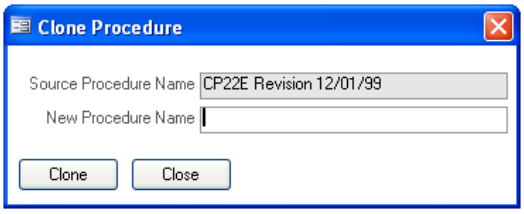

Procedure Entry
Procedure Text
Procedure Image
Attachments
Gage List
Procedure Name
CP22E Revision 12/01/99
Procedure
DIAL, DIGITAL AND VERNIER CALIPERS
www.iso.org
Calibration Frequency: 12 months
(can be modified according to stability, purpose and usage)
1.0 Scope:
This method describes the calibration of calipers, inside and outside dimensions up to 72 inches (1800 mm) and depth dimension up to 12 inches (300 mm).
Instrument resolution: 0.001 or 0.0005 inch (0.02 or 0.05 mm).
2.0 References: This document is based on the DOD procedures.
3.0 Definitions: TI: Test Instrument
DOD: Department of Defense
4.0 General Requirements:
Environment:
· Temperature: Change should not exceed 2 deg. F/hr (1 deg. C/hr).
· Humidity: No excessive humidity.
· Air quality: N/A.
Stabilization:
·Stabilize equipments and standards at ambient temperature.
Preliminary Operations:
Remove
Open Editor
Clone Procedure
Record:
1
of 5

This screen contains the following fields:

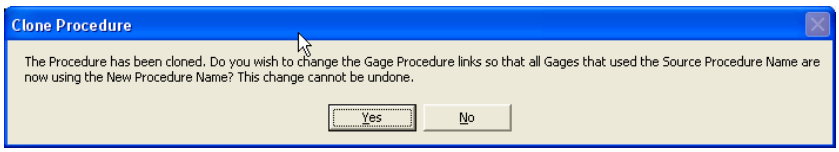
Field/Button Name	Description
Procedure Name	Enter a unique title for each procedure. If you try to create two procedures with the same name, GAGEtrak prompts you that you can't have duplicate index values. If this happens, enter a unique procedure name or click Undo.
Procedure	In this field, enter the text of the procedure. You can set the font, size, color, underline, bold, and other formatting options by clicking the Open Editor button.
Remove button	If you want to keep the procedure in your database, but remove it from your gages, click Remove. This action removes the procedure from all attached gages, but keeps it in Procedure Entry for your reference. If you want to remove a procedure only from a particular gage, go to Gage Entry.
Open Editor button	Opens an external text editor program for editing procedure information.
Clone Procedure button	Opens the Clone Procedure dialog to allow for making a clone of the current procedure.

Clone Procedure

In this dialog, a copy of the existing procedure can be made.



Once the Clone button is clicked, a second dialog will appear giving the user an opportunity to change any gages that referenced the original source procedure to reference the new procedure. **Note**: This change can not be reversed, so be sure this is desired before clicking the Yes button.


Clone Procedure
The Procedure has been cloned. Do you wish to change the Gage Procedure links so that all Gages that used the Source Procedure Name are now using the New Procedure Name? This change cannot be undone.
Yes
No

Field/Button Name	Description
Source Procedure Name	This read only control displays the Procedure name that will be cloned.
New Procedure Name	Enter the name for the new procedure.
Clone button	Click this button to create a clone of the source procedure.
Close button	Clicking this will close the dialog without making a clone.

Copying Procedures from Another Windows Application

You can use Windows Clipboard to copy procedures from other programs. If you want to paste a procedure from the Clipboard:

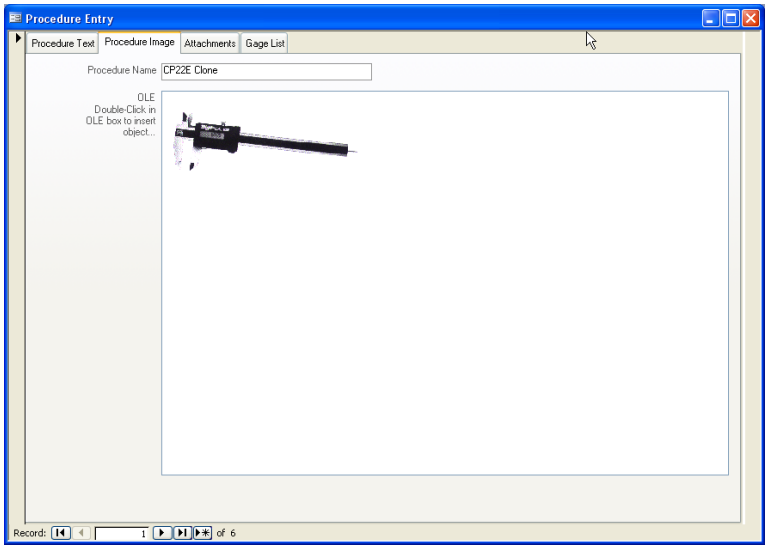
1. Open the program that contains the procedure you want to copy.
2. Highlight the text, and then press CTRL-C to copy it to Windows Clipboard.
3. In GAGEtrak's Procedure screen, first enter a procedure name.
4. Next, click within the Procedure textbox field.
5. Press CTRL-V to paste the procedure.

CalPro Calibration Procedures

To help save time when you're entering procedures, CyberMetrics Corporation offers an optional add-on product called CalPro. CalPro is a database of complete step-by-step calibration procedures, covering everything from gage blocks to micrometers and calipers. CalPro procedures are industry-proven, editable procedures that you can automatically import into your GAGEtrak database or use separately as documents. For information about purchasing CalPro, please contact CyberMetrics Corporation or your distributor.

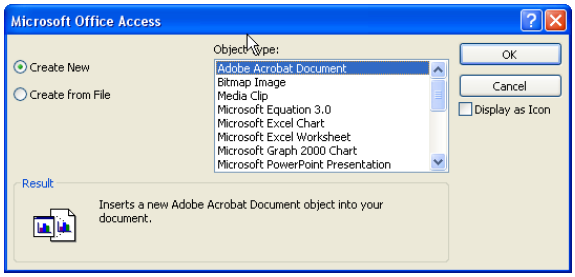
Procedure Entry—Procedure Image

In the Procedure Image screen, you can attach a picture or map to each procedure. To do so, double-click in the OLE box.



"OLE" stands for "Object Linking and Embedding". This means that you can link any valid Windows object (such as a graph, picture, or digitized movie) into this field. When you double-click in the OLE field, the Insert Object box appears, and you can select the program in which you created (or will create) the object.

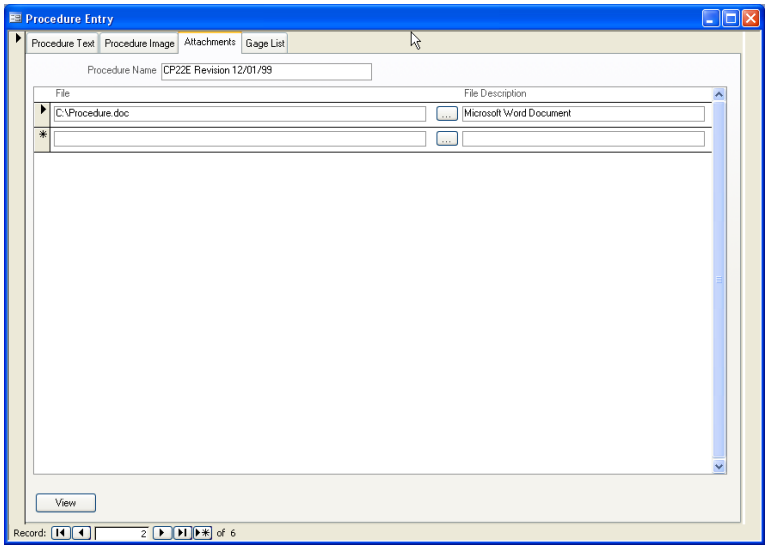
Note: The list of object types varies, depending on which programs are on your computer.



Use the scroll bar to select the type of object you want associated with the procedure, then click OK. When you select an object type, the program in which you created the object opens so that you can edit the image (if necessary). When you're finished, just click inside the OLE object box which links the object to the associated procedure and returns you to Procedure Image.

Procedure Entry—Procedure Attachments

In the Procedure Attachments screen, you can attach additional information related to the specific procedure name, for example an amendment to the existing procedure explaining revised processes.

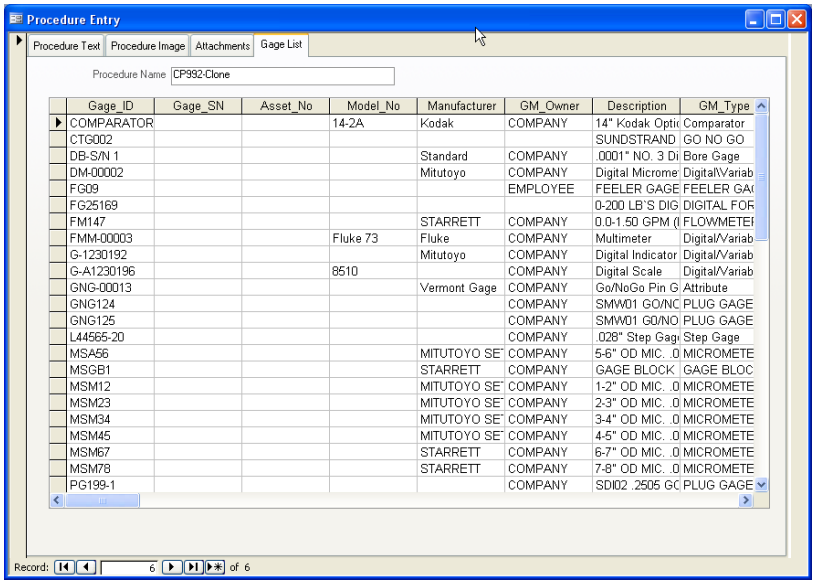


This screen contains the following fields:

Field/Button Name	Description
File	The File textbox can accept manual input of a path and file name of files to attach to a procedure, or you can select the drilldown button to the right of the File textbox and browse for the path and file name with the help of Locate File To Attach form. **Note: Verify that all users of this application have the ability to view the contents of this file. This includes both access to the directory where this file is stored and having sufficient network security rights to open this file.**
File Description	When a file is added manually to the Procedure the user has the opportunity to include a name in the File Description textbox. If the file was automatically inserted with the aid of the Locate File To Attach feature the file format of the selected file attachment will be displayed in the File Description textbox, for example a manual created with Microsoft Word will have a File Description of "Microsoft Word Document".
View Button	Select this button to activate the registered application associated to the file extension, for example Microsoft Word.

Procedure Entry—Gage List

In the Procedure Gage List screen lists all gages affiliated with the particular procedure. At a glance users can see what gages will be effected when a particular procedure is altered. The subform is Read Only for all users.

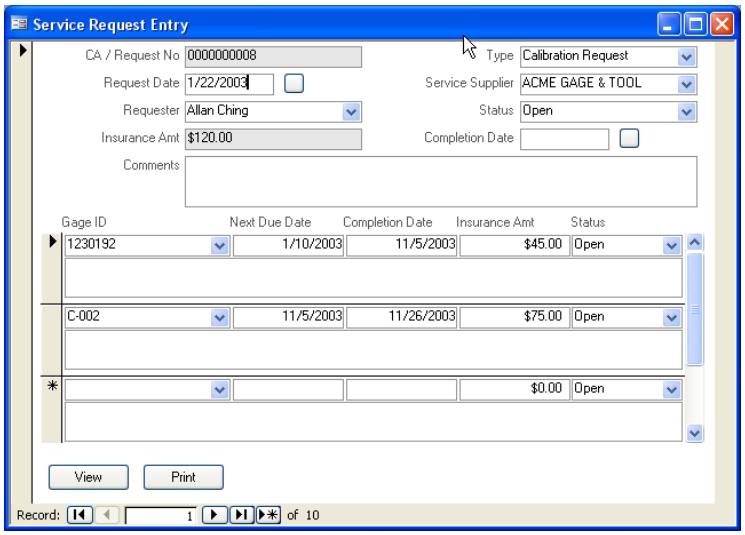


Chapter 6: Entering Service Requests

Service Request Entry

You can use Service Request Entry to track and print service requests for both in-house and outside service providers. More importantly, you can use it to document, track, and report on corrective actions that you've issued for failed or malfunctioning gages.

Select Service Request Entry from the Main Records menu, and the main entry screen will appear.



Field/Button Name	Description
CA/Request No.	This field automatically generates a number to track your requests. You can set up automatic numbering in Setup using your own format.
Request Date	Enter the date or click the small button on the right of this field to automatically enter today's date.
Requester	Select or enter the name of person requesting service.
Insurance Amt	This field displays the total of all insurance amounts from the gages listed below. The original insurance amount is derived from the Cost field in Gage Entry. The field on this form is not editable, but original Gage Entry costs can be modified below for insurance purposes.

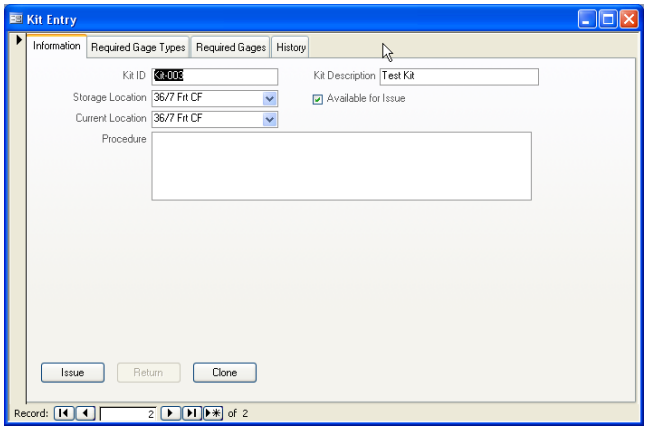
Field/Button Name	Description
Type	Select the type of the document to use (such as Calibration, Repair, Calibration & Repair, or Corrective Action Notice). For directions on adding new documents and editing service request letters or corrective action request forms, see your *System Administrator's Guide*. If the application is set to change the status of a gage when that gage is added to a Service Request, Type is used to determine the new status of that gage. Refer to the Setup | General | Service Request Options section for more information).
Service Supplier	Select the supplier code of the service provider (this might also be a department within your own company).
Status	This field lets you close the service request whether the status of the individual gages listed below is Open or Closed. Closing a service request will also close any Open gages attached to that service request. If the application is set to change the status of a gage when it is returned from a service request, that status change will be made for any gages still Open when the gage Status is set to Closed.
Completion Date	After service on all gages listed below has been completed, use this field to set the completion date for the entire service request. Enter the date or click the small button on the right of this field to automatically enter today's date.
Comments	In this field, enter any notes about this request.
Gage ID	Choose the ID of the first gage for which you need service.
Next Due Date	The gage's next due date is displayed here.
Completion Date	Each gage has a completion date for the service request.
Insurance Amt	Accept the original cost from Gage Entry, or enter a new amount for which you want to insure the device (use for return freight insurance if you're sending the device out for repair or calibration).
Status	Mark the service status for each gage as Open or Closed. If the application is set to change the status of a gage when it is returned from a service request, that status change will be done when the gage's Status is set to Closed.
View	To view the letter currently linked to this record, click View. To view all available letters formatted for Service Request access Setup | Setup CA Service Requests.
Print	Click Print to print the letter associated with this record.

Chapter 7: Kit Entry

A kit is a collection of gages or accessories used to measure a specific part. Gages or accessories comprising a kit may be issued individually, but a kit can only be issued if gages or accessories are complete. To assist you in tracking all your gages and measurements for every specific part, GAGEtrak provides a **Kitting** feature. With this valuable feature, you can create a kit, assign gages to a specific kit, and even track the issuance and return of kits. Also, GAGEtrak allows you to automatically identify gages that can be used to measure a specific part.

Kit Entry—Information

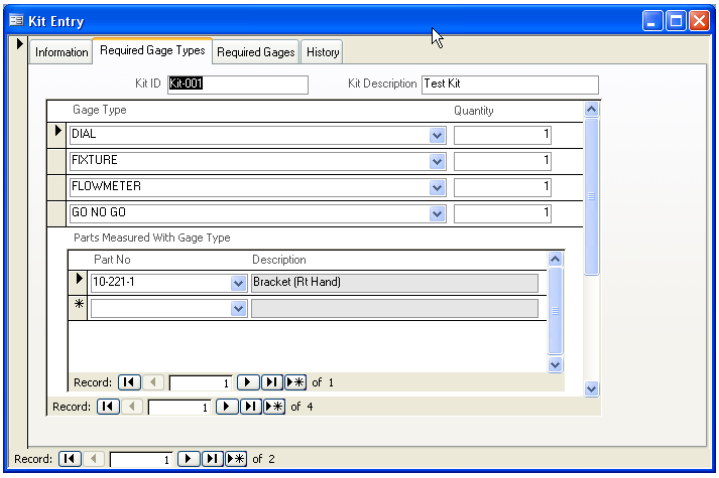
You can create a kit manually by entering all of the gages and other information required into the Kitting window. You can also create kits by cloning existing kits and editing the information to make it unique.



Field/Button Name	Description
Kit ID	Enter a unique identifier for a Kit.
Kit Description	Enter a detailed description of the makeup of the kit.
Storage Location	Permanent location of a kit.
Current Location	Location of kit right now.
Available for Issue	When checked that means that all Required Gage Types and Required Gages have been returned allowing the Kit to be re-issued.
Procedure	Identify the procedure that describes how to use the gages in the current kit with the parts they are measuring.

Kit Entry—Required Gage Types

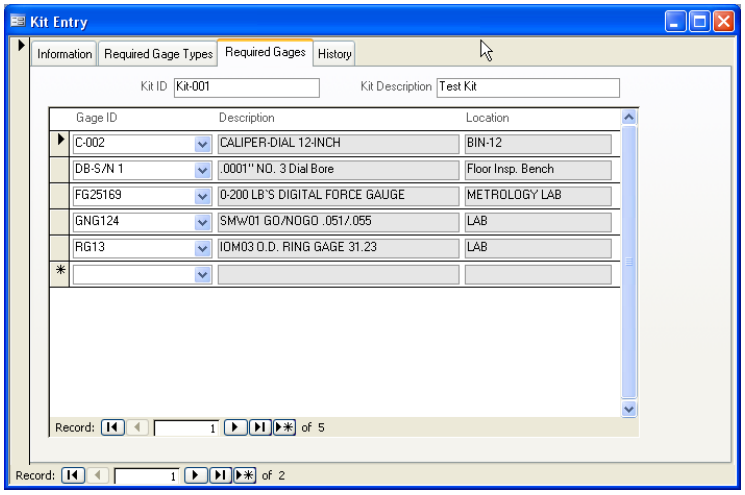
Enter the following information about the gages and parts to be measured. When selecting a Required Gage Type it is not necessary to select gages of that particular gage type under Required Gages because when a gage type is selected under Required Gage Types you are essentially telling the application that the kit will include one or more gages of that type. Likewise, when you select a gage in Required Gages, you are telling the application that that kit will include that exact gage. So there is no need to pick a specific gage when you have already specified that a gage of that type would be included in the kit. Refer to scenarios after Required Gages.



Field/Button Name	Description
Gage Type	Gage Type/Unit of Measure/Size – select the types of gages that are used in the kit. These fields can contain an unlimited number of gages types/units of measure/size.
Quantity	Total per Gage Type.
Parts Measured with	Select the parts that will be measured with each gage type. Using this feature helps you keep track of gages and parts by automatically linking parts to gages when a kit is checked-out. The information in these fields is optional, and you only need to use this feature if your company is required to keep track of all parts that are measured by your gages.
Part No / Description	Part identification.

Kit Entry—Required Gage

Select the specific gages to be used in this kit.



Scenarios

Gage ID	Gage Type
A001	Type A
A002	Type A
A003	Type A

- If you wish to issue Gage ID A001 select the Required Gages tab and select Gage ID `A001`. When this kit is issued you will be issuing Gage ID A001.
- If you wish to issue either Gage ID A001, A002, or A003 select the Required Gage Types tab and select Gage Type `Type A`. When this kit is issued you will be issuing Gage ID A001, A002, or A003.
- If you wish to issue more than one of a gage type of any Gage IDs such as A001, A002, or A003 select the Required Gage Types tab and select Gage Type `Type A`, and enter a quantity of two (2). When issuing this kit, you will be issuing any two combinations of A001, A002, and A003, for example: A001 and A002, or A001 and A003, etc.

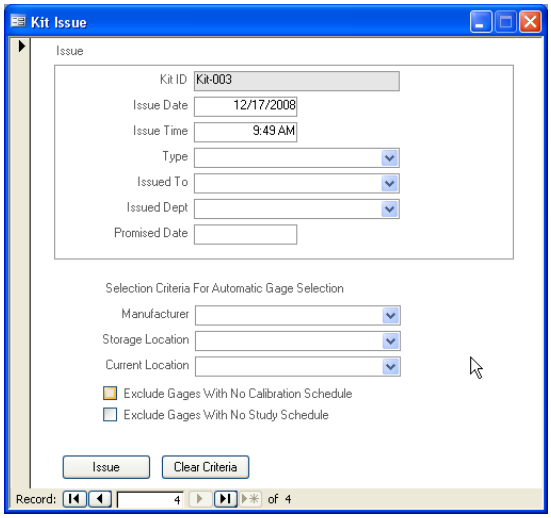
Example: Create a kit and select a gage type of "`Caliper`". If you were then to pick a gage of "`Caliper-001`", then the issue of the kit would include two gages, Caliper-001 (to satisfy the Required Gage **list) and a second Caliper (to satisfy the** Required Gage Type **List). Since it is unlikely that this is the way a kit would be issued, the gages are hidden in the** Required Gage **list that match types in the** Required Gage Type **list. This makes it so the user cannot accidentally select that a kit will include two gages.**

Note: **If the user really does want to issue "Caliper-001" and a gage of type "Caliper", have them pick the Gage first, then pick the Gage Type.**

Issuing a Kit

A kit can only be issued if gages or accessories are complete. GAGEtrak, with its kitting feature, provides several advantages by allowing you to:

- Issue all gages in a kit;
- Issue gages based on several selected criteria and established rules;
- Identify gages that are not issued; and
- Detect gages with up-to-date calibration.



Field/Button Name	Description
Issue Date / Time	These fields are prefilled with the current date and time, but are editable fields.
Type	Self-building list – why kit is being issued.
Issued To	Enter or select a name from the dropdown list box of the person to whom you issue the kit.
Issued Depart	Kit issued to what department?
Promised Date	Expected kit return date.

GAGEtrak uses the following rule to manage the issuance of Kits:

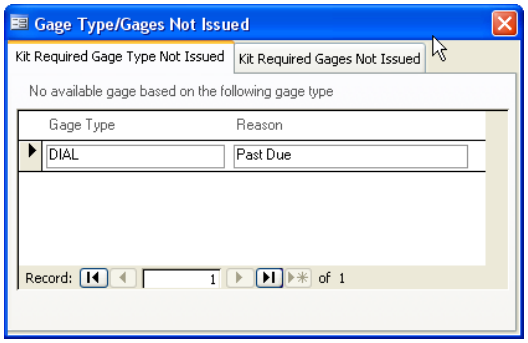
1. When you issue a kit, GAGEtrak inserts the current date and time as the issue date and time. It also changes the kit's Current Location field to a description that consists of Issued To plus Issued Dept. (for example, "675/Job 7512 Final Assy").
2. When a gage is returned GAGEtrak shows it as an open issue record allowing for the received date and time to be entered. After you enter the *Received Date*

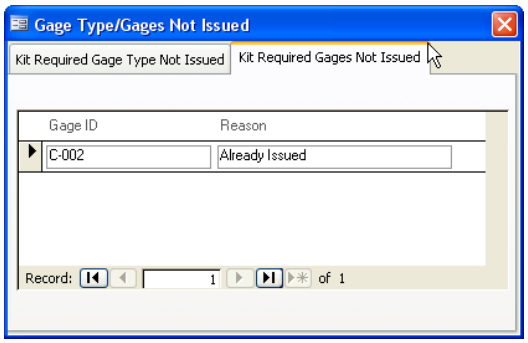
and *Time* and save the record, GAGEtrak changes the kit's *Current Location* field to its *Storage Location*.

Selection Criteria for Automatic Gage Selection

Field/Button Name	Description
Manufacturer	Gages will be selected based on specific *Manufacturer* criteria.
Storage Location	Gages will be selected based on specific *Storage Location* criteria.
Current Location	Gages will be selected based on specific Current Location criteria.
Exclude Gages With No Calibration or Study Schedule	Do you want to export gages that contain no record information in Gage Entry | Schedule and or if no study has been created for this gage?

If in the event a gage cannot be issued in a kit you will be prompted with the following message, None of the gages in this Kit could be issued at this time. Do you want to see a list of the gages that could not be issued as part of this kit? If you select Yes, the following screen appears:

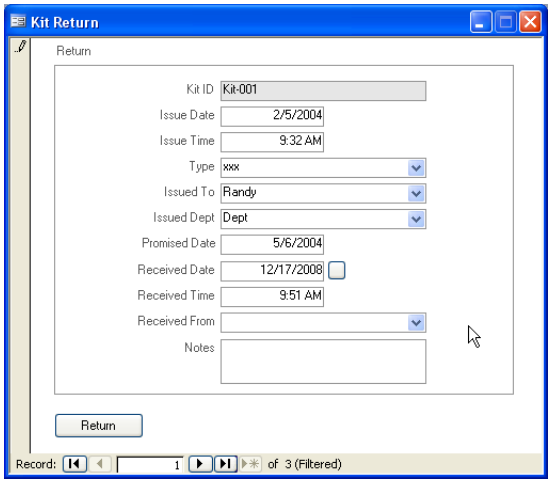




What this screen represents is that there are no "Bore Gage" gage types that are currently available for issuance. GAGEtrak will disallow the issuance of a specific kit when gages that comprise it are not complete, or the gage belonging to the kit is presently issued to somebody else.

Returning a Kit

A kit must have been issued before you can check it in.



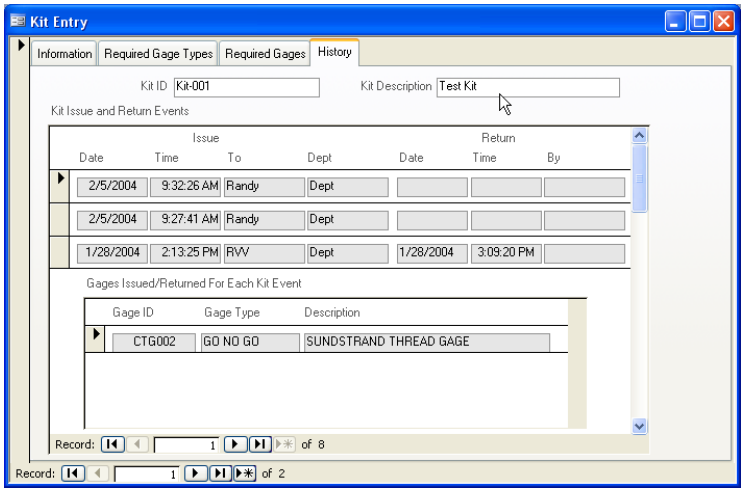
Field/Button Name	Description
Received Date / Time	These fields are prefilled with the current date and time, but are editable fields.
Received From	Enter or select a name from the dropdown list box of the person returning the kit.
Notes	Document any important comments, such as damages or malfunctions.

GAGEtrak uses the following rule to manage the return of Kits:

1. When a gage is returned GAGEtrak shows it as an open issue record allowing for the received date and time to be entered. After you enter the *Received Date* and *Time* and save the record, GAGEtrak changes the kit's *Current Location* field to its *Storage Location*.
2. You will need to enter the number of cycles that the gage(s) on this kit used if returning a kit that contains gage records that have a calibration frequency of Cycles. Use the number of cycles entered by the user to enter into the Issue/Return record for every "Cycles" gage that was returned in the kit. Usage Used, Usage Left, and Estimated or Actual Due Date for each gage will be calculated and reflected under Calibration Schedule in Gage Entry.

Kit Entry—History

Select the History tab to view all gages that were previously issued/returned by a particular kit. To view previous kit issue/returns, first find the appropriate kit.



Kit Entry—Reports

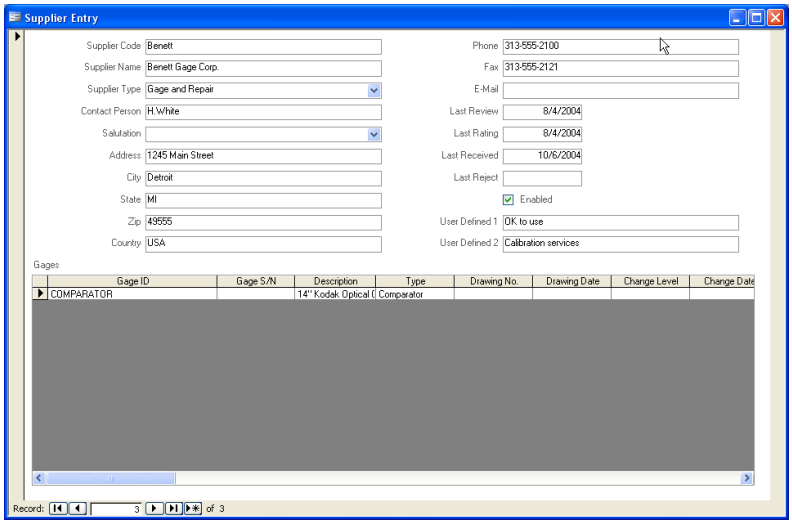
Kitting reports list all, or one specified kit, and its associated Required Gage Types, and Part To Be Measured. To view or print the kitting report, click Report from the main menu bar and select Kitting Reports.

Chapter 8: Entering Supplier Records

Supplier Entry

To begin entering supplier records, go to the main menu, then select the Main Records icon and click on the Supplier Entry button.

The Supplier Entry window will appear; it is similar to the window shown below:



To create a new supplier record, click the New Record button at the bottom of the window. Each supplier record contains the following fields:

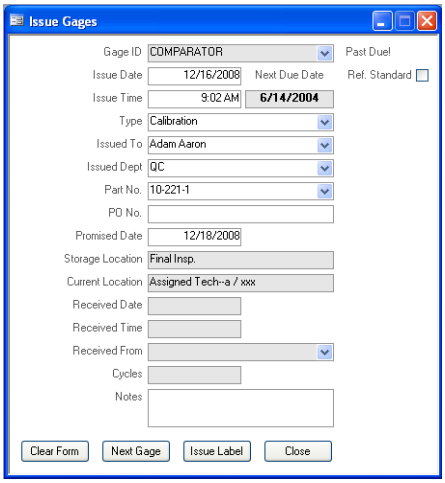
Field/Button Name	Description
Supplier Code	Enter a unique supplier ID or code for each supplier.
Supplier Name	Enter the company name of the supplier.
Supplier Type	Use this field to categorize your suppliers by the type(s) of goods sold.
Contact Person	Enter the name of the contact person for this supplier company.
Salutation	Enter a salutation for the company contact to be used for written correspondence (such as Mr., Ms., or Mrs.). Leave this field blank if you don't want to use a salutation (i.e., Joe Smith vs. Mr. Joe Smith).

Field/Button Name	Description
Address, City, State, Zip, Country, Phone, and Fax	Enter the complete supplier address, including phone and fax numbers.
E-Mail	Use this field to store the contact person's e-mail address.
Last Review and Last Rating	Enter the date of the last quality review and last quality rating for this supplier.
Last Received and Last Rejected	Enter the date on which you last received a shipment from this supplier and the date on which you last rejected a shipment from this supplier.
Enabled	Check this box to indicate that the supplier is currently active and approved.
User Defined 1 and 2	Enter any other information that you wish to track on this supplier. Be sure to use these fields consistently throughout your supplier records.
Gages	This table lists all gages obtained from this supplier. This table is not editable; if you need to edit the gage information shown in this table, you must do so under Gage Entry.

Chapter 9: Gage Issue and Return (Batch Mode)

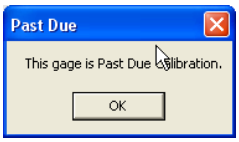
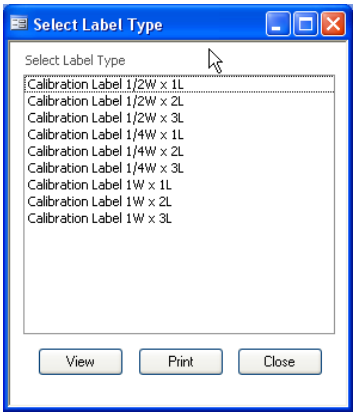
You can issue and return gages one at a time via Gage Entry (click the Issue/Return button to open Issue Tracking Entry). For higher-volume, batch-mode processing of gage issues and returns, use Issue Gage and Return Gage. Intended for use in a gage or tool crib, this feature was designed for bar-coded data entry, but will also work with manual keyboard entry.

Issue Gages



The Issue Gages fields are as follows:

Field/Button Name	Description
Gage ID	Select a Gage ID of a gage available for issuance. A non-selectable button labeled *Past Due! appears t*o the right of the Gage ID field if you have selected a gage with a calibration schedule already past due.

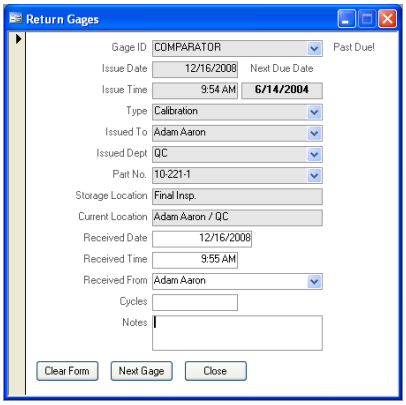
Field/Button Name	Description
Next Due Date	Issue Gages will generate the Next Due Date when you issue out a gage with a frequency UOM other than Usage and or Cycles, unless Usage and or Cycles is due for calibration then a Next Due Date will be generated. If the gage is due for calibration, this message will appear when the past due gage is selected. 
Issue Date and Issue Time	These fields track the gage issuance date and time—the fields are prefilled with the current date and time, but are editable fields.
Type	Choose the type of issue; this field creates a self-building list as you enter different descriptions.
Issued To	Enter or select the person to whom you issue the gage, however, the name selection for this field may be dependent on the Gage Entry – Auth. Persons – Restrict Issue selection. For more information, see Restrict Issue under Gage Entry | Auth. Persons.
Issued Dept.	Select or enter the department or job number that will use the gage.
Part No.	Use this field to track the part or group of parts that the gage will measure.
PO No.	You can enter a Purchase Order number if you're sending the gage out to a supplier for repair or calibration or are manufacturing parts for a customer.
Promised Date	Enter the date on which you expect the gage to be returned to you.
Storage Location	This field shows where the gage is stored when not in use. You cannot edit this field.
Current Location	Show the current location of the gage. You cannot edit this field.
Clear Form	This button clears all fields in the form.
Next Gage	If you have other gages to issue, click this button to issue the gage.
Issue Label	Allows you to print a Select Label Type for the gage being issued. **Note:** A label printer must be installed to accommodate this request.  The printed label shows the predicted Next Due date for a gage based on the frequency set for the gage, unless the frequency was set to Usage or Cycles and the gage is not ready for calibration, then the Est Due date will appear on the label.

Field/Button Name	Description
Close	Click the Close button to save the record and exit the screen.

GAGEtrak uses the following rules to manage Issue Tracking records:

1. When you issue a gage, GAGEtrak inserts the current date and time as the issue date and time. It also changes the gage's Current Location field to a description that consists of Issued To plus Issued Dept. (for example, `675/Job 7512 Final Assy`).

Return Gages

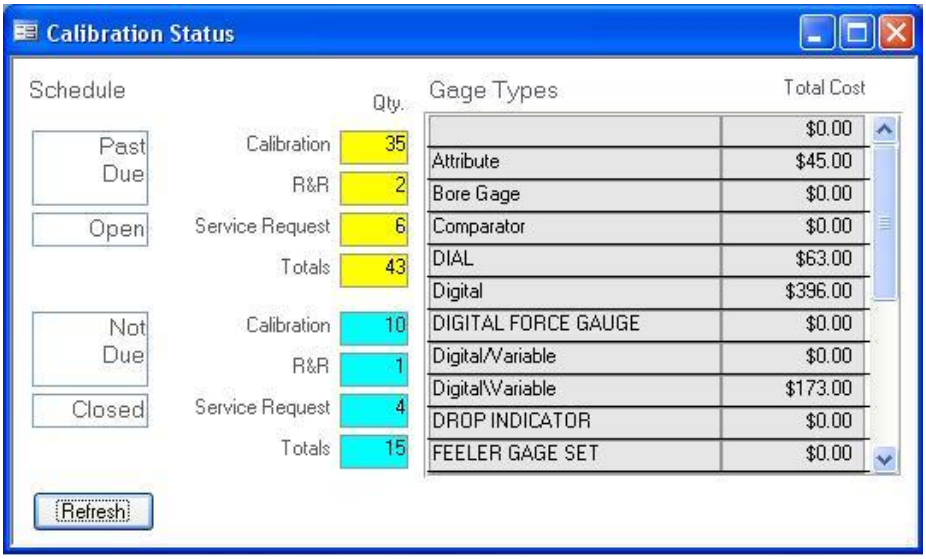


The Return Gages fields are as follows:

Field/Button Name	Description
Gage ID	Select the gage ID to return. The list is limited to issued gages only.
Received Date and Received Time	These fields show the date and time at which you received the gage–they're prefilled with the current date and time.
Received From	In this field, enter or select the name of the person that returned the gage.
Cycles	Enter the number of cycles used or parts measured by the gage. GAGEtrak adds this value to any previous cycles for the gage, and then uses that value to calculate the *Next Due Date* for gages that you calibrate according to cycles.
Notes	Document any important comments, such as damages or malfunctions.
Clear Form	This button clears all fields in the form.
Next Gage	If you have other gages to return, click *Next Gage* to process the record.
Close	When you're finished, click the *Close* button to return to the main menu.

After you enter the Received Date and Time and save the record, GAGEtrak changes the gage's *Current Location* field to its *Storage Location*.

Calibration Status



GAGEtrak's Calibration Status window gives you a quick view of your work status.

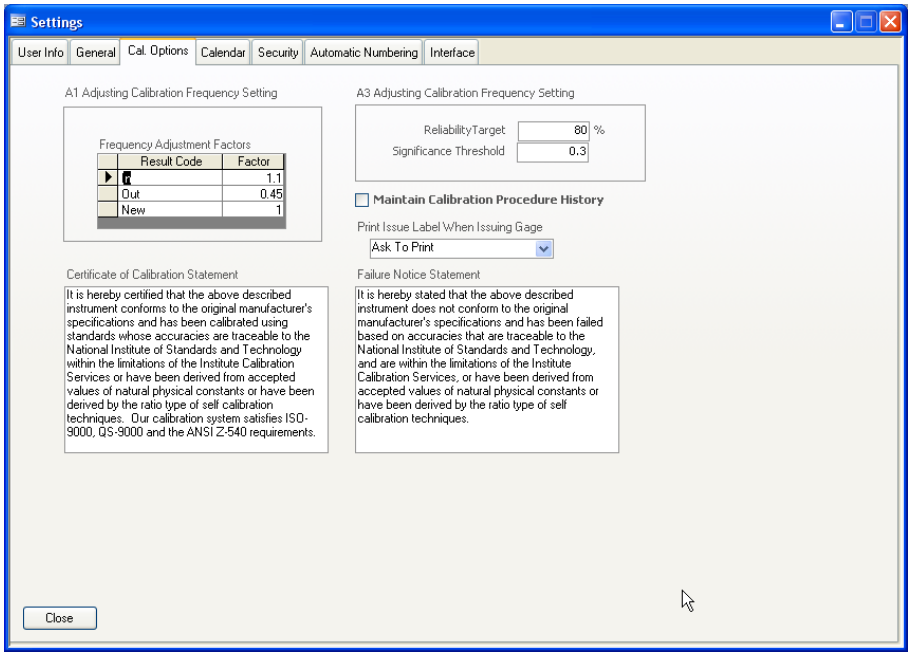
At a glance the number of Past Due and Not Due calibrations, R&R studies and Open and Closed Service Requests can be viewed. The window also displays the Total Cost of gage inventory by *Gage Type*, (use the scrollbar to the right of the form to view the complete list of gage types). To get an up to the minute display, click the Refresh button.

Chapter 10: Gage Frequency Adjusting Interval

This module applies only to gages where “Method A3” has been specified for Gage Frequency Adjusting Method. (This is specified in Gage Entry on the Calibration Schedule tab). GAGEtrak also offers method A1. These terms refer to methods that are outlined in Recommended Practice RP-1 “Establishment and Adjustment of Calibration Intervals” (3/96). RP-1 is a publication of NCSL International, a professional organization for standards labs. See www.ncsli.org.

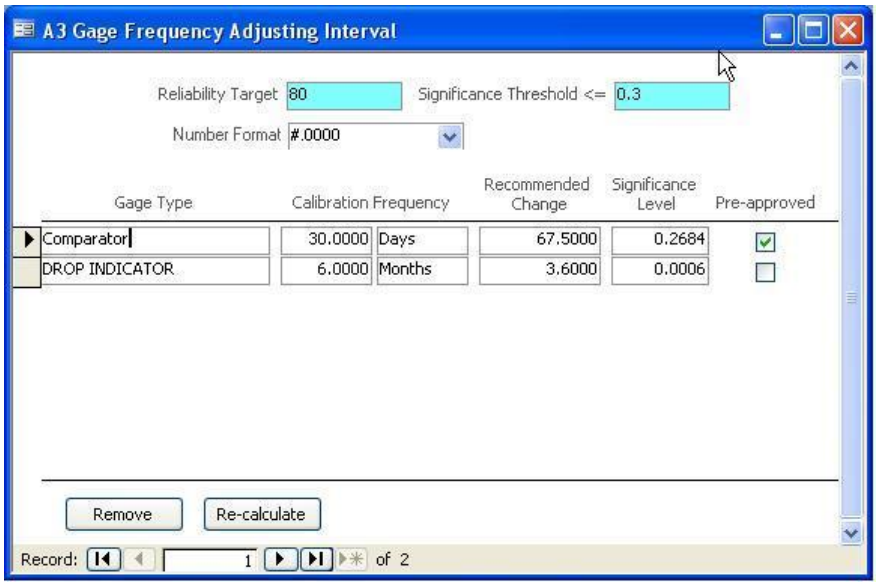
Method A3 lets you specify a reliability target, and requires a low risk of making unnecessary changes, before recommending that a change in calibration frequency is necessary. Reliability is defined as the probability that a gage will still be “in” tolerance at the end of the calibration interval. GAGEtrak estimates the current reliability by combining the calibration histories of all gages with the same gage type, and same calibration frequency. Then, based on the reliability target, GAGEtrak calculates the probability that a change is not needed (called significance). If significance is below the significance threshold then GAGEtrak suggests a recommended change. When a change is found to be necessary, method A3 uses formulas that optimize the calibration frequency in fewer steps than Method A1.

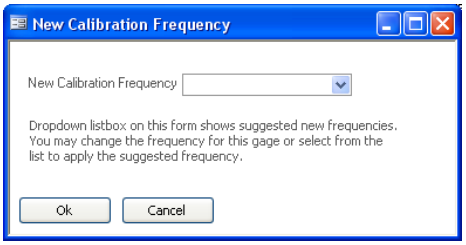
When Method A1 is chosen, as opposed to Method A3, the calibration frequency usually changes every time you calibrate, even after the calibration frequency has achieved high end-of-period reliability. Most users will prefer less frequent changes, and may not want the short calibration intervals that go with “high” reliability. Method A1 is included for users who are familiar with it, and wish to continue using it. Method A1 does not make use of the module we are discussing, but does use parameters that can be changed in Setup | Settings | Cal. Options | A1 Adjusting Calibration Frequency Setting.


Settings
User Info
General
Cal. Options
Calendar
Security
Automatic Numbering
Interface
A1 Adjusting Calibration Frequency Setting
Frequency Adjustment Factors
Result Code
Factor
Out
1.1
Out
0.45
New
1
A3 Adjusting Calibration Frequency Setting
Reliability Target
80
%
Significance Threshold
0.3
Maintain Calibration Procedure History
Print Issue Label When Issuing Gage
Ask To Print
Certificate of Calibration Statement
It is hereby certified that the above described instrument conforms to the original manufacturer's specifications and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limitations of the Institute Calibration Services or have been derived from accepted values of natural physical constants or have been derived by the ratio type of self calibration techniques. Our calibration system satisfies ISO-9000, QS-9000 and the ANSI Z-540 requirements.
Failure Notice Statement
It is hereby stated that the above described instrument does not conform to the original manufacturer's specifications and has been failed based on accuracies that are traceable to the National Institute of Standards and Technology, and are within the limitations of the Institute Calibration Services, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of self calibration techniques.
Close

If the checkbox is checked, then procedure entry will not allow you to edit or delete a procedure that has already been used for one or more calibration records.

In Gage Entry, on the Calibration Schedule tab, you may specify a Maximum Interval or Minimum Interval, or both. Methods A3 or A1 will notify you in the event that a recommended change is being overridden by these specifications.



Field/Button Name	Description
Reliability Target	This is the desired end-of-period reliability. i.e. the desired probability that the as-found condition of the gage will be "in tolerance" at the end of the calibration period (after the optimum calibration frequency has been achieved). GAGEtrak will recommend changes to the calibration frequency until the specified reliability is obtained. The default Reliability Target is 80%. Specifying higher reliability will result in more frequent calibration. You can't change this here. To change this go to Setup | Settings | Cal. Options | A3 Adjusting Calibration Frequency Setting.
Number Format	Choose the number of decimal places you want to be displayed.
Significance Threshold	This is the maximum amount of risk GAGEtrak will take in recommending a change. i.e., the risk that a recommended change will turn out not to have been necessary. The default is 0.3. Specifying lower significance will increase the number of calibrations required to make a decision. You can't change this here. To change this go to Setup | Settings | Cal. Options | A3 Adjusting Calibration Frequency Setting. Significance must be between 0 (never change) and 1 (always change).
Gage Type	Gage Types listed here have one or more gages specified in Gage Entry to use method A3. If a Gage Type has more than one Calibration Frequency in use, it may appear more than once.
Cal Frequency	Calibration Frequencies that were used to calculate a current due date are listed here for each listed Gage Type.
Recommended Change	This is a new calibration frequency to be used for the next due date. GAGEtrak will recommend a change if the Significance is below the Significance Threshold.
Significance Level	The risk (probability) that the Recommended Change will turn out not to have been necessary.
Pre Approved	Check here if you want to change the Calibration Frequencies in Gage Entry effective immediately. This will not change the current due dates, but will affect future due dates starting with the next calibration. Since currently scheduled calibrations will continue at the old calibration frequency, the Recommended Change will be updated in the future and could possibly revert to "no change." If that happens, you will be asked during each calibration to approve the latest recommended change on a gage-by-gage basis. You will also be asked in the event that you have not checked Pre Approved. If there are multiple recommended changes (because more than one frequency is in use) you will be asked to confirm that GAGEtrak is suggesting the right one. When you are asked, you will also have the opportunity to manually enter a calibration frequency. 

New Calibration Frequency
New Calibration Frequency
Dropdown listbox on this form shows suggested new frequencies. You may change the frequency for this gage or select from the list to apply the suggested frequency.
Ok
Cancel

Method A3 Formulas

α = significance at I_0

g = number in tolerance at I_0

n = number calibrated at I_0

I_0 = existing interval

I_1 = new interval

R_0 = reliability at existing interval

R = reliability target

$R_0 = g/n$

If $R_0 < R$, $\alpha = 2\sum_{k=0}^{g} \frac{n!}{k!(n-k)!} R^k (1-R)^{n-k}$

If $R_0 \geq R$, $\alpha = 2\sum_{k=g}^{n} \frac{n!}{k!(n-k)!} R^k (1-R)^{n-k}$

α will not be allowed to exceed 1.

Use the following formulas if $\alpha \leq$ Significance Threshold

Extrapolation Formulas

$I_1 = \ln R / \ln R_0$ for $0 > R_0 < 1$

$I_1 = (1 + 1/R)I_0$ for $R_0 = 1$

$I_1 = (1 + R/2)I_0$ for $R_0 = 0$

Interpolation formulas (Used when a change(s) has already been made, that has proved to be excessively large):

$I_2 = (I_0 + I_1)/2$

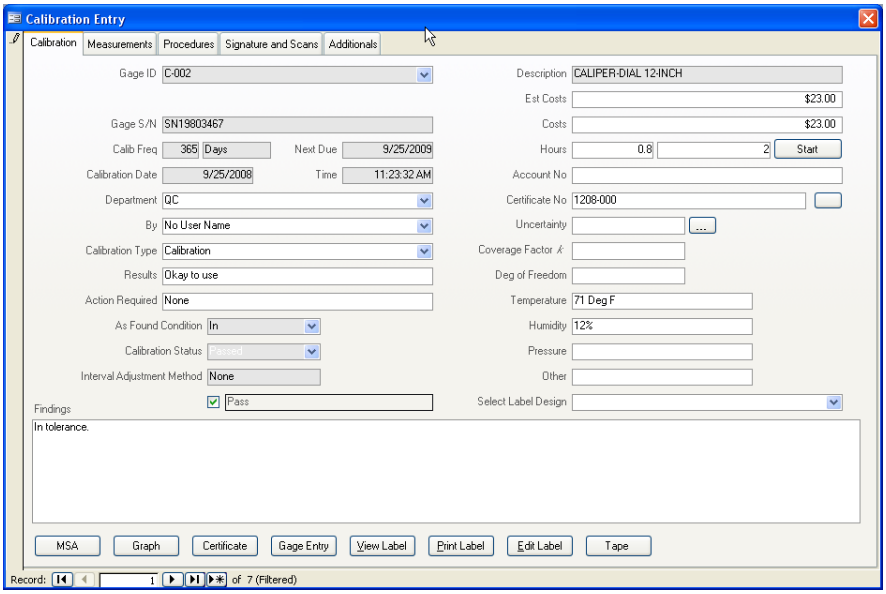
Each subsequent increment of change is reduced by half.

Chapter 11: Entering Calibration Records

Calibration Entry—Calibration

To enter calibration records, select Calibration Entry from the Calibrations menu, (you may also select the *Calibration* button from the Gage Entry—Information window). A window similar to the one shown below will appear.

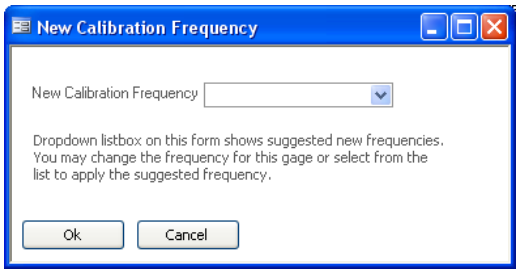
When you first open this screen, GAGEtrak displays the most recent calibration record. If you filtered for a group of gages, the most recent record for the first gage in the group will appear.

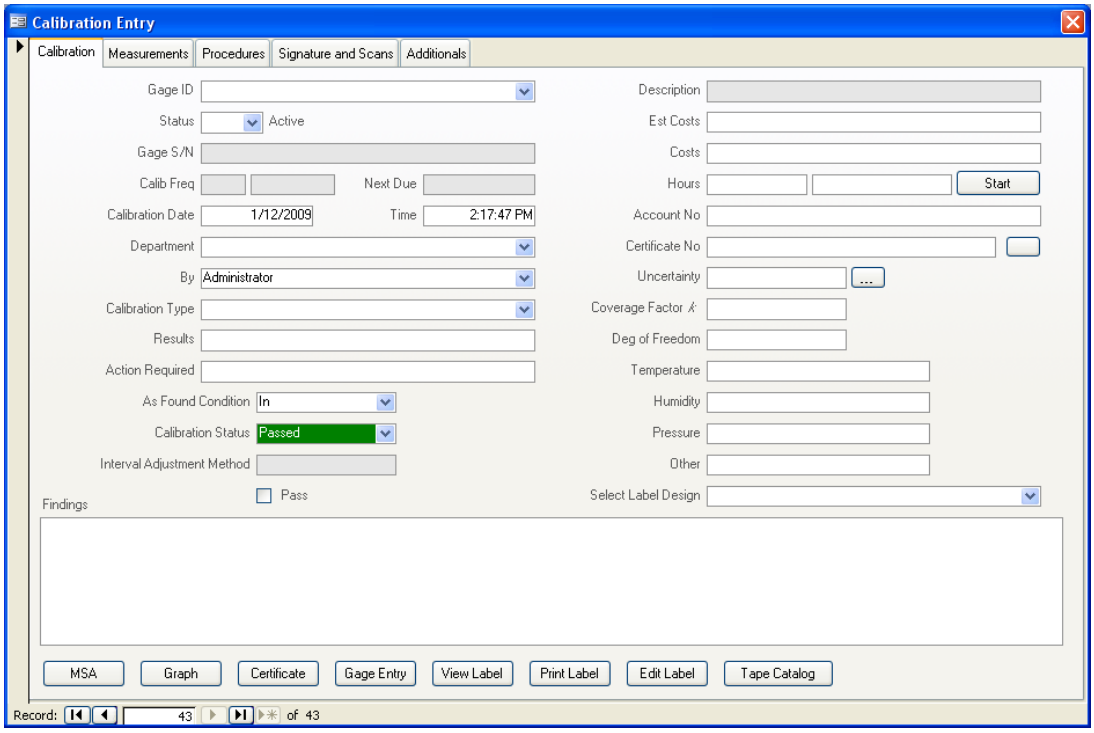


To create a new calibration record, click on the New Record button, and then select the desired gage record from the Gage ID drop-down menu near the top of the window. After you save the record by entering information into this screen (such as your department), GAGEtrak automatically retrieves any standards you set up for the gage.

Since currently scheduled calibrations will continue at the old calibration frequency, the New Calibration Frequency form will appear when new record is selected that will contain a recommended change based on what was selected for the Gage Frequency Adjusting Method under Gage Entry.

The recommended change will be updated in the future and could possibly revert to “no change.” If that happens, you will be asked during each calibration to approve the latest recommended change on a gage-by-gage basis. If there are multiple recommended changes (because more than one frequency is in use) you will be asked to confirm that GAGEtrak is suggesting the right one. When you are asked, you will also have the opportunity to manually enter a calibration frequency.


New Calibration Frequency
New Calibration Frequency
Dropdown listbox on this form shows suggested new frequencies.
You may change the frequency for this gage or select from the
list to apply the suggested frequency.
Ok
Cancel



Each calibration record contains the following fields:

Field/Button Name	Description
Gage ID	Use the drop-down list box to select from a list of available Gage IDs. **Tip: Once you've selected a gage to calibrate, do not change this field. After you save the calibration record, you can't edit this field. If you want to enter another calibration record for this gage or for another gage, click the *New Record* button first.**
Status	The indicated status of the gage at the time of calibration will reflect as 1-Active, 2-In-Active, 3-Out for Repair, 4-In Calibration, 5-Lost. **Note: The calibration Status field will disappear and cannot be edited once the calibration record has been passed.**
Description	GAGEtrak looks up the gage's description from its Gage Entry record and displays it here (you can't edit it in this screen).
Gage S/N	This field displays the gage's serial number; you can't change it here.
Calib Freq.	After you mark the gage as having passed calibration, GAGEtrak displays the calibration frequency that you entered in Gage Entry. If you need to edit this value, do so in Gage Entry. Calibration frequencies are stored with the calibration record. This allows you to maintain a complete history of calibration frequencies and how they might change over time. **Note: If you made a selection from the *Gage Frequency Adjusting Interval* section for this gage, whenever you enter a new calibration record, GAGEtrak will automatically adjust the *Calibration Frequency*, according to the rules you defined in the *Adjusting Calibration Frequency Settings* table. Please see the *System Administrator's Guide* for details.**
Next Due Date	This field stores the next due date for calibration, based on the calibration frequency. You must check the *Pass* box in order for GAGEtrak to show the next due date. **Note: If a gage has a calibration frequency of *Usage* or *Cycles* and the gage is not past due for calibration you will not be presented with a Next Due Date – this field will remain blank until the gage needs to be calibrated.**
Calibration Date	Use this field to store the date of the calibration—it's automatically set to the current date. You can change it until the calibration record is saved.
Time	Like the Date field, this field automatically displays the current time. If you change the time, enter it in this format: HH:MM. This field is required.
Department	In this field, select or enter the name of the department that used the gage before calibration.
By	Select or enter the name of the person who calibrated the gage. This field automatically displays the name of the current user, but you can change it.
Calibration Type	In this field, enter the type of work being performed, such as `calibration`, `repair`, or `rebuild`.
Results	Enter any results or comments (typically used for attribute-type gaging or dimensional layouts). Enter calibration measurements into the Measurements table (see below).
Action Required	Enter any action that may be required, such as "send out for repair".

Field/Button Name	Description
As Found Condition	Choose the condition of the gage before calibration or adjustment. Select `In` for in-tolerance, `Out` for out-of-tolerance, or `New` for a new instrument that has not been calibrated before. Prior to calibration, *all* test points of the instrument must be within tolerance to have the As Found Condition field set to In. You need this information only if you've chosen Auto Adjust Calibration Frequency for this gage (see the *System Administrator's Guide* for details).
Calibration Status	Select the final calibration status: Passed, Failed, Repaired, or Limited.
Interval Adjustment Method	This is non editable field based on the Gage Frequency Adjusting Interval selection made for this record in Gage Entry | Calibration Schedule.
Pass	You must check this box in order for the program to automatically calculate the next calibration due date (*Calibration Frequency* + *Calibration Date*). **Note: The calibration Status field will disappear and cannot be edited once the calibration record has been passed.**
Findings	Use this memo field to describe any other pertinent information, such as visual inspection notes. You can scroll through this field if you need more room for text. **Note: Your certificates of calibration will include this field.**
Est Costs	Projected calibration cost.
Cost	To track your costs, enter any expenses related to this calibration (such as internal labor/material costs or outside calibration service costs).
Hours	There are two fields for hours. The gray Hours field will display the estimated hours that you entered for this gage in Gage Entry. The white Hours field applies to this particular calibration. Enter the actual amount of time the calibration required, or click the Start button to use the built-in calibration timer (see below).
Account No.	Enter an account number or other tracking number associated with the cost (examples include a job, purchase order, invoice, or customer number).
Certificate No.	Record the certificate number issued by the outside calibration provider or your company. You can use this field in one of two ways. You can type in any alpha-numeric information you wish or you may use automatic numbering. If you want to use automatic numbering, you must first set up your numbering in Setup|Settings|Automatic Numbering. You can specify a numbering format and view the last number used.
∑ Uncertainty	This field is for the Uncertainty sum – input by user.
Coverage Factor k	This multiplier is used to convert Combined Uncertainty to Expanded Uncertainty.
Deg of Freedom	This is also called "effective degrees of freedom". If input on the Calibration form this value will appear on the Certificate of Calibration and on the Failure Notice reports.
Temperature, Humidity, Pressure and Other	Enter the relevant environmental conditions for the calibration: *Humidity*, *Temperature*, *Pressure*, or any other factor that may affect results. If you have an appropriate USB temperature and humidity sensor, you can double-click in the Temperature or Humidity controls to have the application read these values from the sensor.

Field/Button Name	Description
Select Label Design	Choose the label design to print out the calibration record
MSA Button	To enter a study for the current gage, click the MSA button (MSA studies are explained in *MSA Studies*).
Graph Button	To view an accuracy chart, click the Graph button.
Certificate Button	If a calibration has been passed, select this button to view a summary or a detailed Certificate of Calibration report. If the calibration record has not been passed, in essence the calibration has failed, you will be notified as such and will be given the opportunity to print a Calibration Failure Notice report.
Gage Entry Button	Use this button to switch to the **Gage Entry** record for the current gage.
View Label Button	Generates the label based on the label design selected.
Print Label Button	Sends the selected design for the label directly to the printer.
Edit Label Button	When selected the Custom Report Editor module is opened, allowing you to update the label design selected. **Note: Updating the label from this location will update the original label.**
Tape Button	View an online label catalog.

Calibration Timer Button

Use the Start button next to the Hours field to time your calibration—it works like a stopwatch. When you're ready to calibrate, just click the Start button. Its name will change to Stop. When you're finished, click Stop, and GAGEtrak will automatically calculate the hours for you. The timer is *cumulative*. This allows you to temporarily stop the timer and do something else. Just click the Stop button to stop the timer, then, when you're ready to resume, click the Start button again. The time is expressed in decimal hours (the smallest unit of time is 0.01 hours, which equals 36 seconds):

Example 1: 0.25 hours = 0.25 x 65 minutes = 15 minutes

Example 2: 0.01 hours = 0.01 x 65 minutes = 0.6 minutes

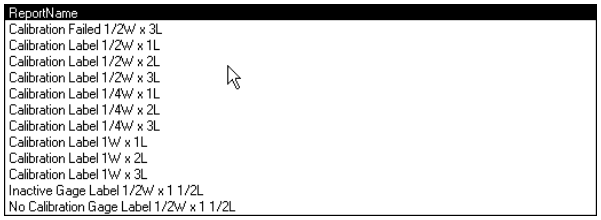
Select Uncertainty Method / Budget form

The Select Uncertainty Method / Budget form allows for the user to choose between using the Root Sum Uncertainty method, choosing an existing Uncertainty Budget, or to enter a value manually to determine how the Uncertainty in calculated for a particular calibration. Simply click the unlabeled button to the right of the ∑ Uncertainty control to bring up the

Select Uncertainty Method / Budget form. The four buttons are the only controls that are active on this form (Calc, Clear, Close, and Select Uncertainty Study).

Field/Button Name	Description
Calc button	To use the Root Sum of Squares method, click on the Calc button.
Clear button	If values need to be entered manually, click the Clear button. This will set the values in Uncertainty, Coverage factor k, an d Degrees of Freedom controls to null and enable them, allowing user to enter values.
Close button	Closes the Select Uncertainty Method / Budget window.
Select Uncertainty Study button	To the right of each Uncertainty Study listed is a button allowing the user to choose that study for calculating Uncertainty, Coverage Factor k, and Degrees of Freedom. The values in the selected study will be used to calculate each of the values. **Note:** An Uncertainty Budget must be created to utilize this function.

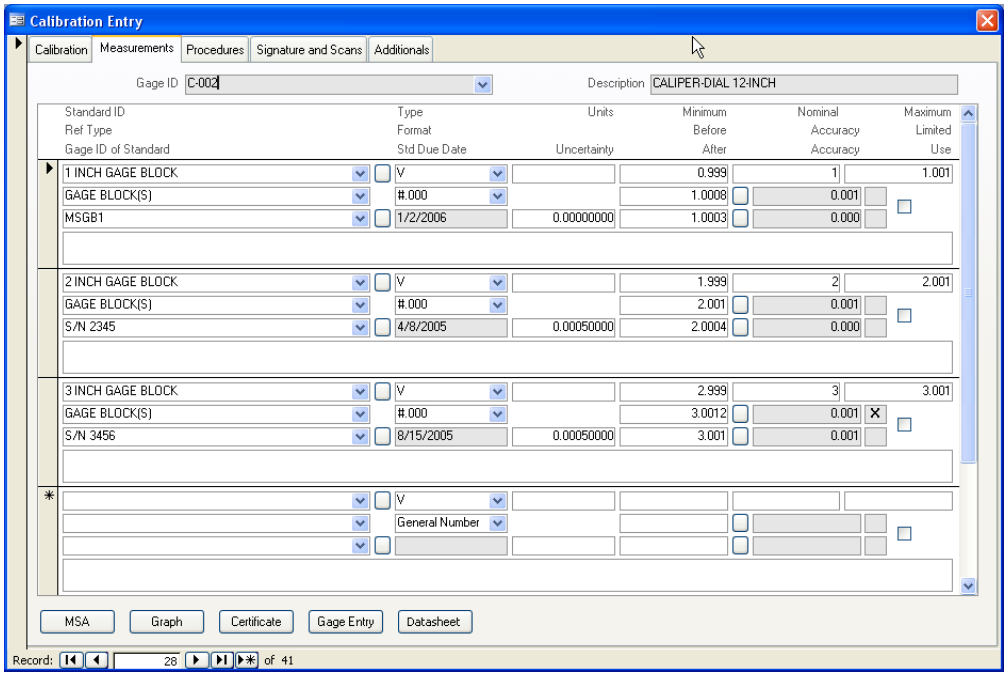
Select Label Design field / drop-down list


ReportName
Calibration Failed 1/2W x 3L
Calibration Label 1/2W x 1L
Calibration Label 1/2W x 2L
Calibration Label 1/2W x 3L
Calibration Label 1/4W x 1L
Calibration Label 1/4W x 2L
Calibration Label 1/4W x 3L
Calibration Label 1W x 1L
Calibration Label 1W x 2L
Calibration Label 1W x 3L
Inactive Gage Label 1/2W x 1 1/2L
No Calibration Gage Label 1/2W x 1 1/2L

Using the Select Label Design drop-down list, you can print a calibration label for the current record. Just select the name of the label you wish to print in the Select Label Design drop-down menu. You can use this feature only if you've installed the optional GAGEtrak Calibration Label Kit printer and software (shown below).

The Calibration Label Kit prints durable, laminated, cut-to-length calibration labels. It includes a printer that attaches to your PC's serial or USB port so it won't interfere with your default printer. It also includes label design software, fonts, clip art, and bar codes—features that let you use it for many other quality control and production labeling applications. For more information about the kit, please contact CyberMetrics Corporation or your distributor.

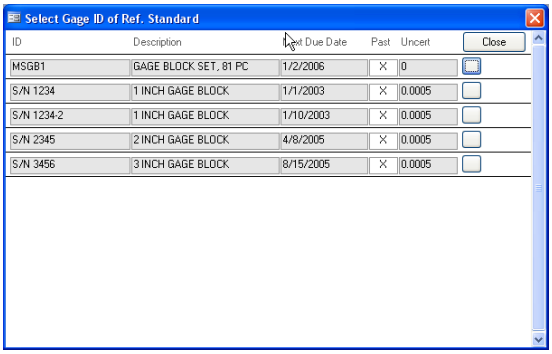
Calibration Entry—Measurements



You can use this screen to compare the actual before and after measurements of the gage with the standards that you use to calibrate the gage.

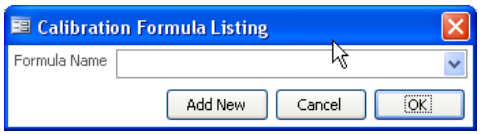
You will use these fields in the Measurements screen:

Field/Button Name	**Description**
Standard ID	GAGEtrak copies the *Standard IDs* from the Calibration Standards table that you defined in Gage Entry.
Type	Two types of calibration standards available: Variable 'V' or Attribute 'A'. Select *Variable* for those standards that have a value that you actually measure (such as 0.502 inches). Select Attribute for pass/fail or visual types of checks. Selecting Attribute does not calculate accuracy of particular standard. GAGEtrak copies it from Gage Entry, if entered, or you can select it here.
Units	The program also copies the units of measurement from Gage Entry.
Minimum, Nominal, and Maximum	GAGEtrak copies the gage's Minimum, Nominal, and Maximum values from Gage Entry.
Ref Type	Enter the type of the reference standard being used as to Attribute or the specific type of the reference gage.
Format	Specify the format for the numeric display.

Field/Button Name	Description
Before	Enter the actual measurement observed before you adjust the gage. The button to the right of this field brings up the Calibration Formula Listing; for more information, see *Calibration Formula Listing*.
After	Next, enter the actual measurement observed after you adjust the gage. The button to the right of this field brings up the Calibration Formula Listing; for more information, see *Calibration Formula Listing*.
Accuracy (Before)	This field shows the accuracy value based on the before measurement (Before minus Nominal).
Accuracy (After)	In this field, you'll see the accuracy value based on the after measurement (After minus Nominal).
Limited Use	Based on the gage's accuracy compared to its calibration standard, use this box to restrict the gage to limited use, meaning that it shouldn't be used for measurement of this particular range.
Gage ID of Standard	This field stores the Gage ID of the reference standard, which is important for traceability back to a specific standard. You can manually enter the standard's gage ID or select from a list of available standards (shown below) by clicking the small button on the right of this field. The list shows only those gage records that have "X's" in their Gage Entry Ref. Standard checkboxes.  **Note:** A gage cannot be selected if a Reference Standard is past due for calibration. Gage ID of Standard is limited to Reference Standards with no Due Date or Next Date Due in the future.
Std Due Date	Calibration schedule next due date.
Uncertainty	If you select the reference standard from the list, the uncertainty value will automatically display. If you manually enter the standard, then enter its uncertainty value here. You can obtain this value from the manufacturer; it's expressed in units, such as percentage (0.5%), proportion (0.005), or measurement (0.0001 inch). You must enter units of the same value —otherwise, the calculated ∑ Uncertainty will be wrong.

Calibration Formula Listing

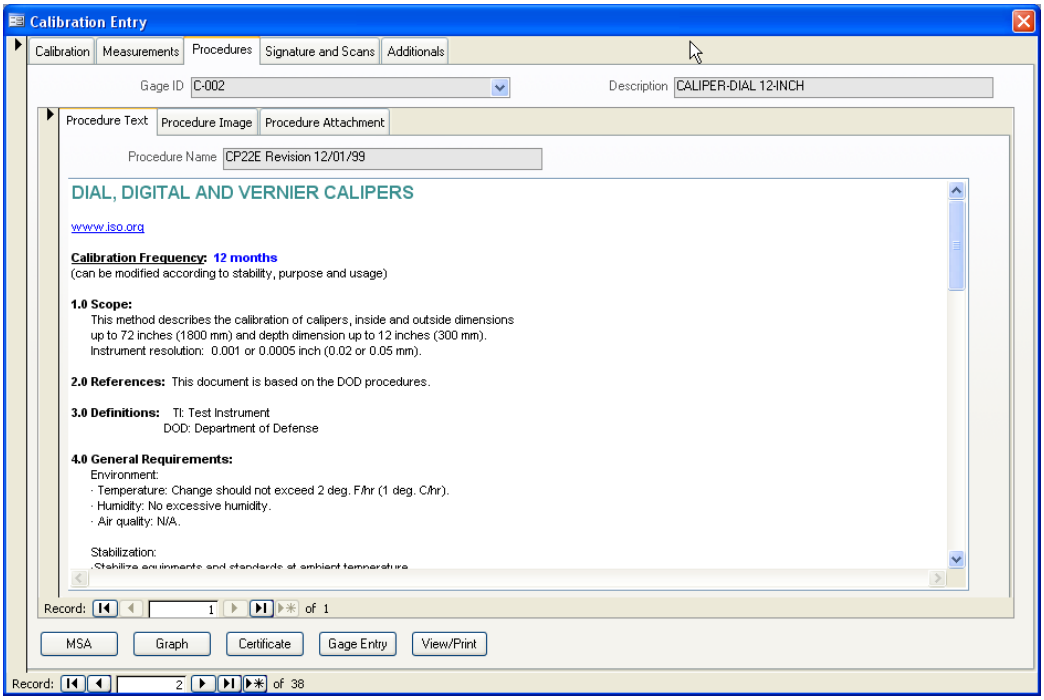
Use the Custom Formula button next to the Before or After fields to help calculate a Before or After value if there is not a calibration reading for the selected standard—the Calibration Formula Listing works like a calculator based on predefined or user defined formulas, originally set in Formula Entry.



Select a predefined formula from the dropdown list box. You will notice that the value present in the field is retained from the last input for the selected formula calculation. Either retain the value or input a new value and select OK – formula computes. You will be reverted back to the Measurements form and the newly calculated value will have populated the field, which in turn helps in computing the accuracy values. This field is an editable field. If the Add New button is selected the Formula Entry module will open for your use. Refer to *Calibration—Formula Entry* for more information.

Calibration Entry—Procedures

In this screen, you can see any calibration procedures that are attached to the gage. This contains three additional tabs. The Procedure Text tab is shown below. It holds the description of the attached procedure.


Calibration Entry
Calibration
Measurements
Procedures
Signature and Scans
Additionals
Gage ID C-002
Description CALIPER-DIAL 12-INCH
Procedure Text
Procedure Image
Procedure Attachment
Procedure Name CP22E Revision 12/01/99
DIAL, DIGITAL AND VERNIER CALIPERS
www.iso.org
Calibration Frequency: 12 months
(can be modified according to stability, purpose and usage)
1.0 Scope:
This method describes the calibration of calipers, inside and outside dimensions up to 72 inches (1800 mm) and depth dimension up to 12 inches (300 mm).
Instrument resolution: 0.001 or 0.0005 inch (0.02 or 0.05 mm).
2.0 References: This document is based on the DOD procedures.
3.0 Definitions: TI: Test Instrument
DOD: Department of Defense
4.0 General Requirements:
Environment:
· Temperature: Change should not exceed 2 deg. F/hr (1 deg. C/hr).
· Humidity: No excessive humidity.
· Air quality: N/A.
Stabilization:
Record: 1 of 1
MSA
Graph
Certificate
Gage Entry
View/Print
Record: 2 of 38

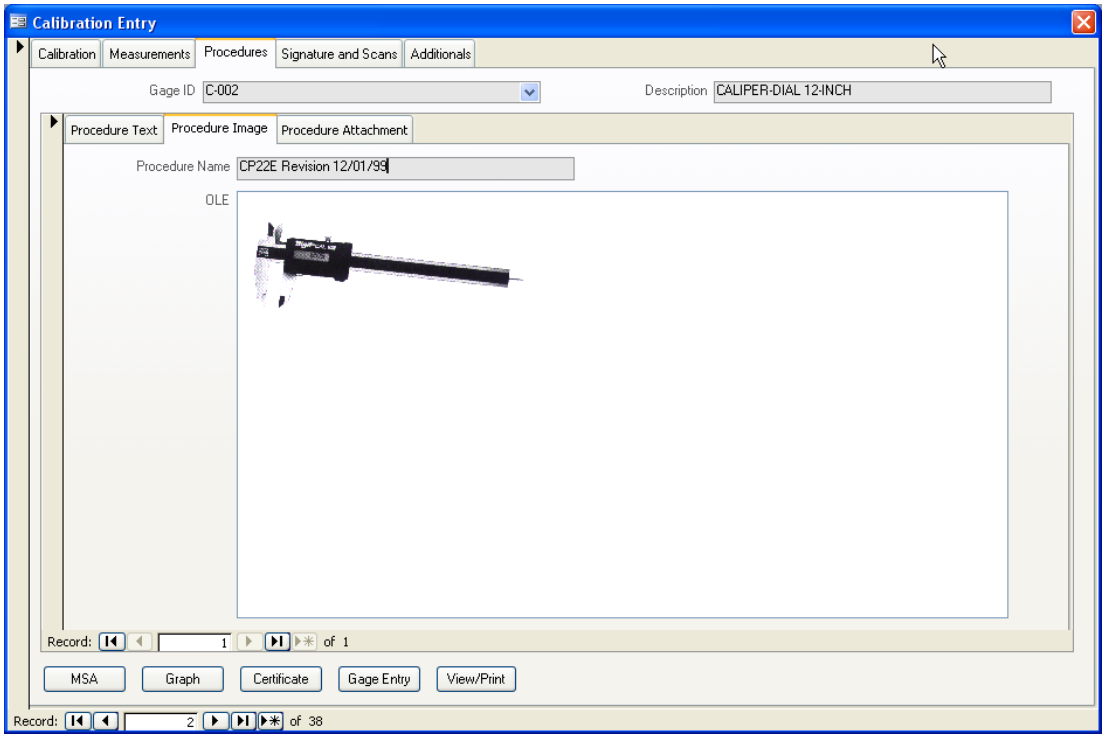
The first procedure appears automatically; to view additional procedures for this gage, click the record navigation button at the bottom left corner of the inner window.

Tip: You can't edit procedures here—you can only view them. To edit procedures, go to Procedure Entry.

The following table describes the fields in this area:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Description	The description of the selected gage will appear in this field
Procedure Text Tab	Information under this tab includes the *Procedure Name*, *Procedure Content* and an *OLE* (Object Linking and Embedding) affiliated with the gage ID record.
View/Print Button	If there is a single procedure attachment associated with the current procedure and the View/Print button is clicked, the procedure attachment will open when clicked. If there are multiple procedure attachments, select the *Procedure Attachments* tab and select each attachment separately for viewing.

The Procedure Image tab contains any image associated with the procedure.

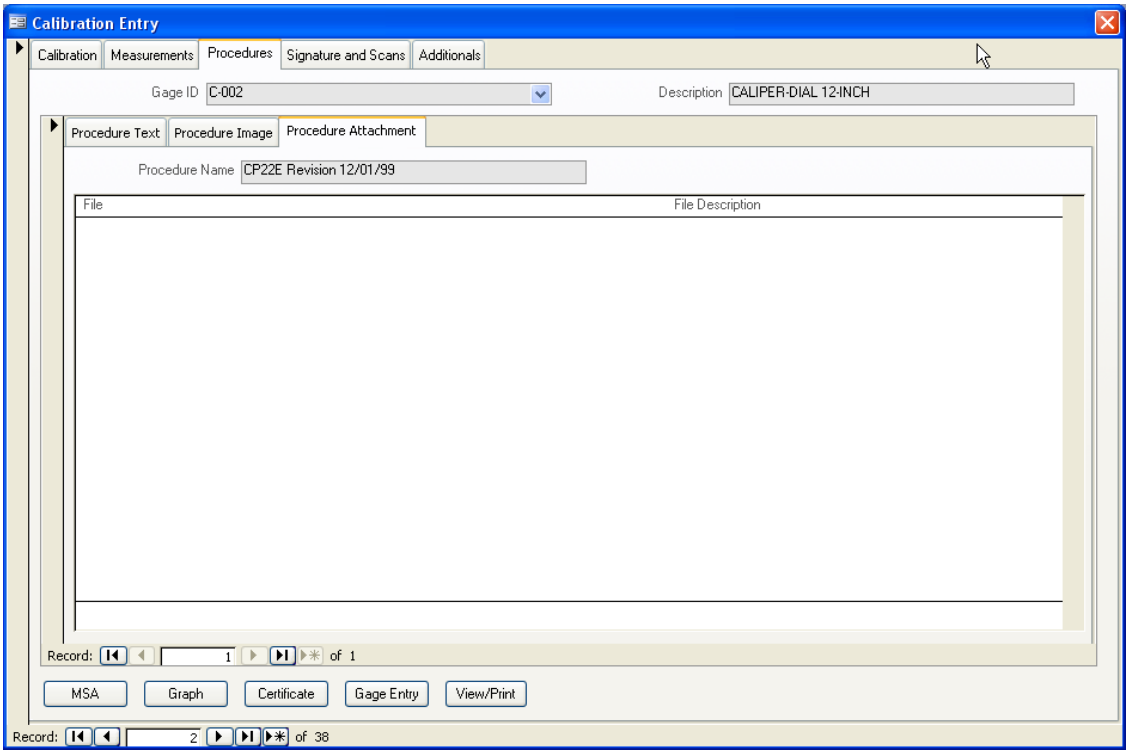


The table below describes the fields in this area:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Description	The description of the selected gage will appear in this field
OLE	The image associated with the procedure is displayed in this field.

Field/Button Name	Description
View/Print Button	If there is a single procedure attachment associated with the current procedure and the View/Print button is clicked, the procedure attachment will open when clicked. If there are multiple procedure attachments, select the *Procedure Attachments* tab and select each attachment separately for viewing.

The Procedure Attachment tab displays any file attachments to the procedure. In this particular example, the procedure does not have any attached file.



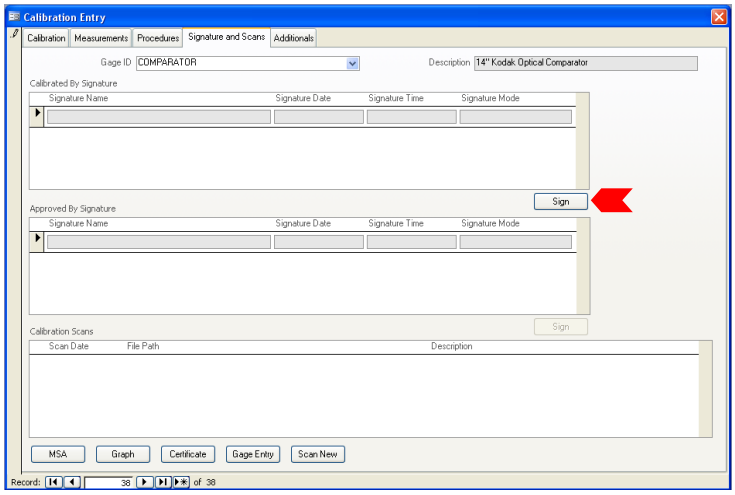
The table below describes the fields in this area:

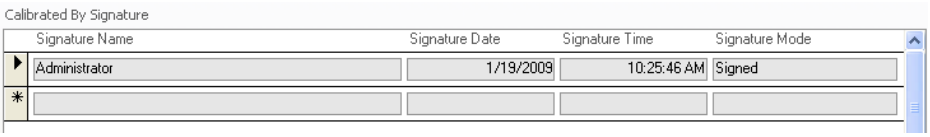
Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
File	Path of file attachment. **Note:** Verify that all users of this application have the ability to view the contents of this file. This includes both access to the directory where this file is stored and having sufficient network security rights to open this file.
File Description	Description of attached file type. For example, if the attached file is a Microsoft Word document the Description field will contain Microsoft Word Document.
View/Print Button	Select this button to open the selected file with that file type application.

Calibration Entry—Signature and Scans

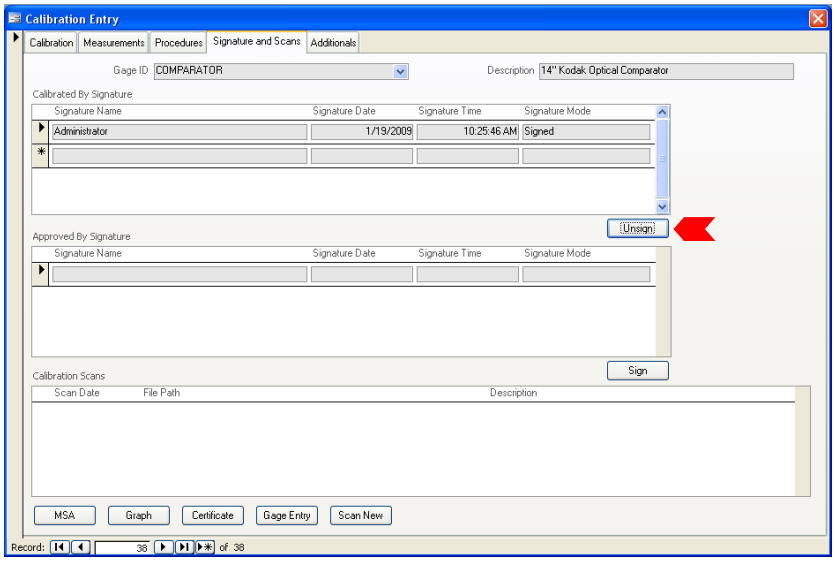
If your system administrator has enabled security, calibrations can be electronically signed or unsigned. Signatures are drawn from the User ID listing in Setup—Security—Users. (For more information, see Security—Users in the GAGEtrak *System Administrator's Guide*. Click the Sign button to sign your calibration; GAGEtrak will save the signature and stamp it with the current date and time.

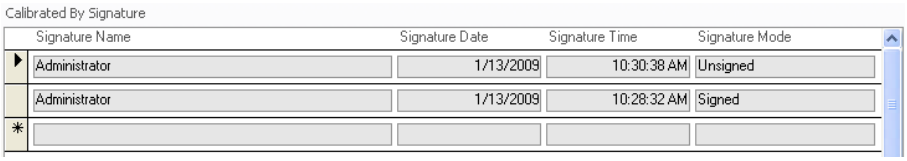
Note: The User ID is case insensitive where as the password is case sensitive.





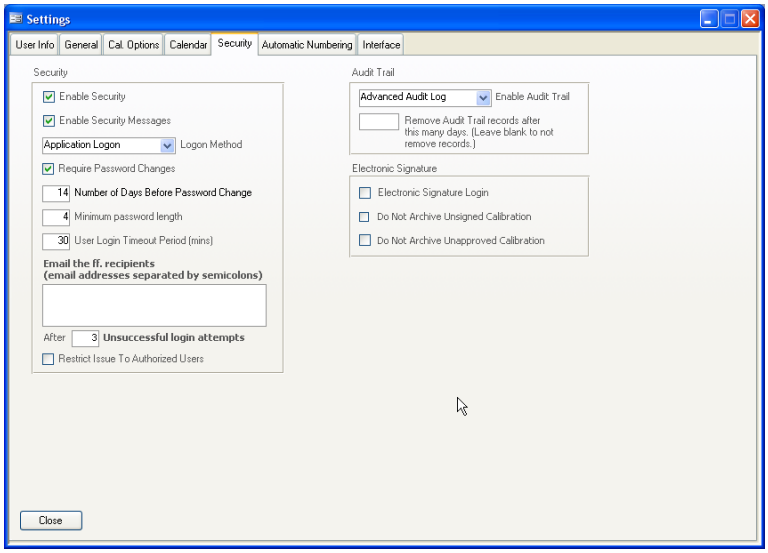
To unsign a calibration, select the signature in the signature listing. The Sign button is replaced with the Unsign button as seen below. Click on the Unsign button; GAGEtrak will show that the record has been unsigned and stamp the record with the current date and time.





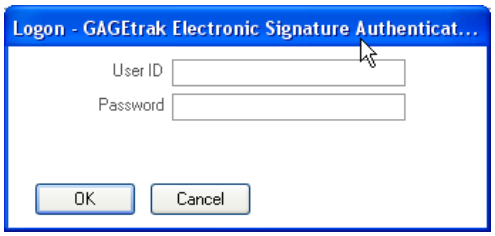
All signatures are recorded with the name of the signer, the date and time of the signature, and the signature mode (whether the calibration was signed or unsigned).

To use electronic signatures, security must be enabled. To do this, close the Calibration Entry window to return to the Main Menu. Click on the Setup icon on the left-hand side of the Main Menu, and then click on the Settings button. The Settings window will appear. Click on the tab labeled Security and check the Enable Security checkbox; then select Application Logon from the Logon Method drop-down list.



For more information on GAGEtrak's security settings, see Security in the *System Administrator's Guide.*

Click on the checkbox labeled Electronic Signature Login to require users to login with their User ID and password whenever they click on the Sign or Unsign button. This feature helps prevent unauthorized signatures; if it is not activated, GAGEtrak will automatically record the currently logged-in user as the signer when the Sign or Unsign button is clicked.

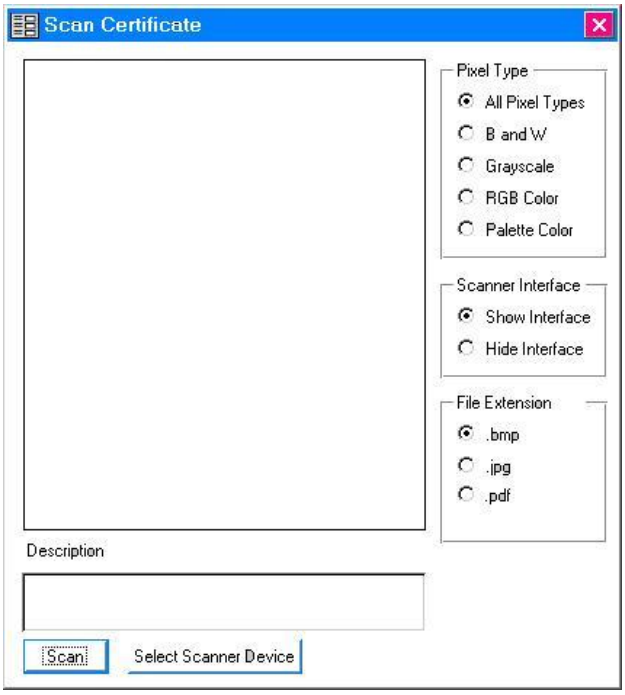


When Security is disabled, you cannot use electronic signatures.

GAGEtrak provides the option of scanning in certificates from TWAIN-compliant scanners that can be stored with the calibration records.

Note: If a calibration has been signed the calibration scan feature will be disabled and the user will not be allowed to delete, edit or create new scans. The scanned page files still exists if a scanned record is deleted and you will need to delete this file yourself using the File Manager supplied with your operating system. The user will however be able to view/print scans.

To begin scanning documents select the Scan New button. The following form will appear:

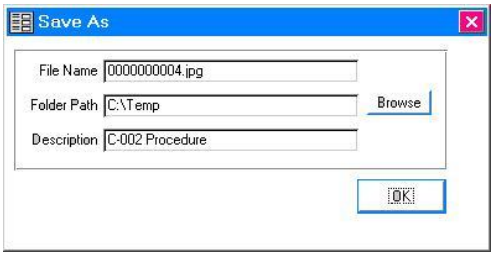


This form is where you can scan your calibration certificates images and documents.

Note: Your TWAIN device needs to be set before you can use the scan feature. You can do this by clicking on the Select Scanner Device **button. The** Select Source **dialog will appear. If the desired scanner is not highlighted as shown, click on it to highlight it; then click on the** Select **button and you will be returned to the** Scan Certificate **dialog.**

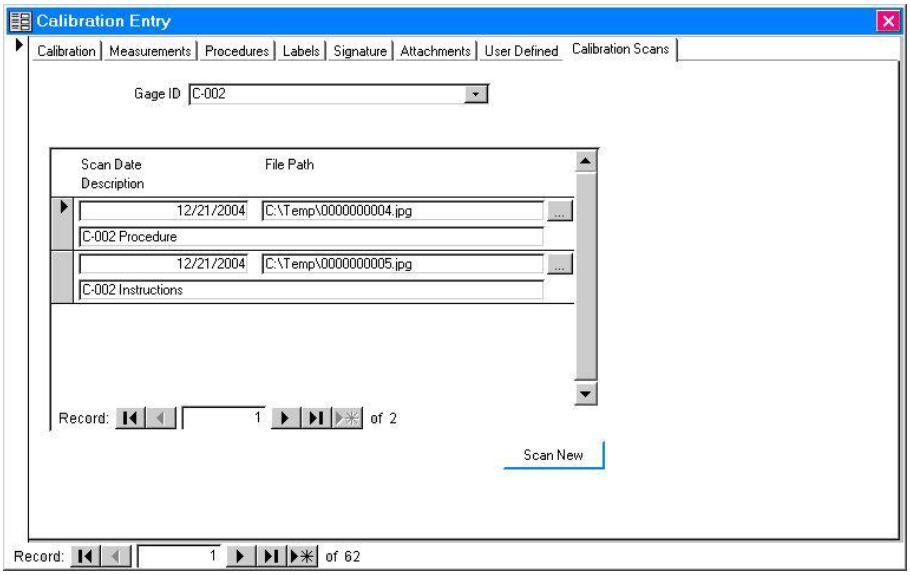
You can select the Scan button to start scanning your images after you have selected the device, set the pixel type (refer to your scanner literature for more information regarding pixel types), and whether or not to see the scanner interface.

If the scanning is successful, the scanned image will be displayed in the Image View Control, prompting you to save the image and include a description if necessary.



Note: Verify that all users of this application have the ability to view the contents of this file. This includes both access to the directory where this file is stored and having sufficient network security rights to open this file.

When you close this form, a new record will be added to the Calibration Scans form, noting the Scan Date, Description, and the file path.



If you click on the "…" drill-down button the application will look for the image and open it with the application that is registered for that file type in the workstation's registry.

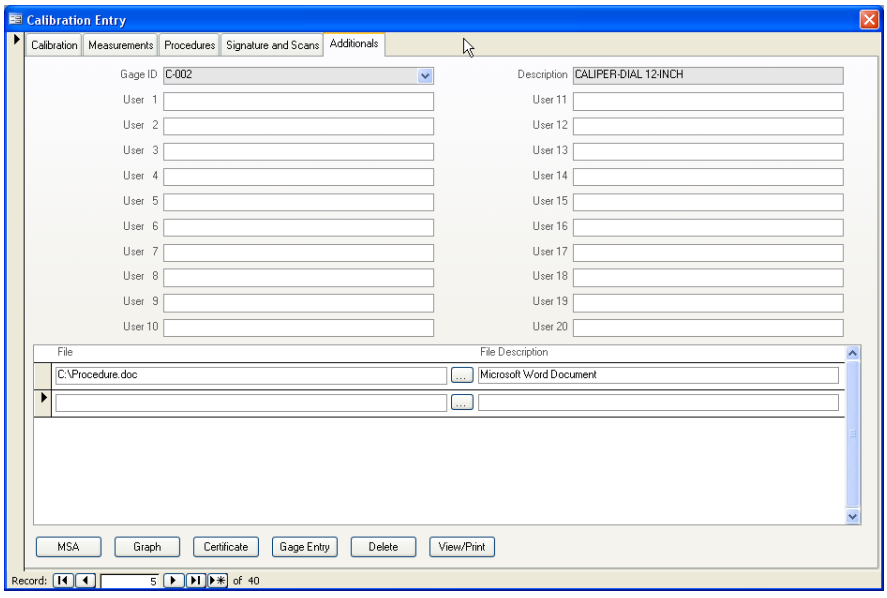
Note: If GAGEtrak cannot find the application registered for the certificate's file type, you will be prompted to pick an application to open it with. An Open With **dialog box will appear, listing all the applications installed on your computer. Select an image-viewing or image-editing application; it will launch and open your image file.**

If GAGEtrak cannot find the image file in the location stated in the file path, you will be prompted to browse for the file. Navigate to your certificate file through the Open File **dialog box that appears. You will be prompted to change the path in your GAGEtrak database to the selected file. Choose** Yes **to update the file path and open the file.**

Calibration Entry—Additionals

These fields can be used to store additional information and can be customized, the label names changed, and the data types altered, in Setup | Settings | Interface | Gage Custom.

This feature allows the attaching of many different file formats for Calibration Entry. The application will use the registered application for that extension to determine what application will be opened.

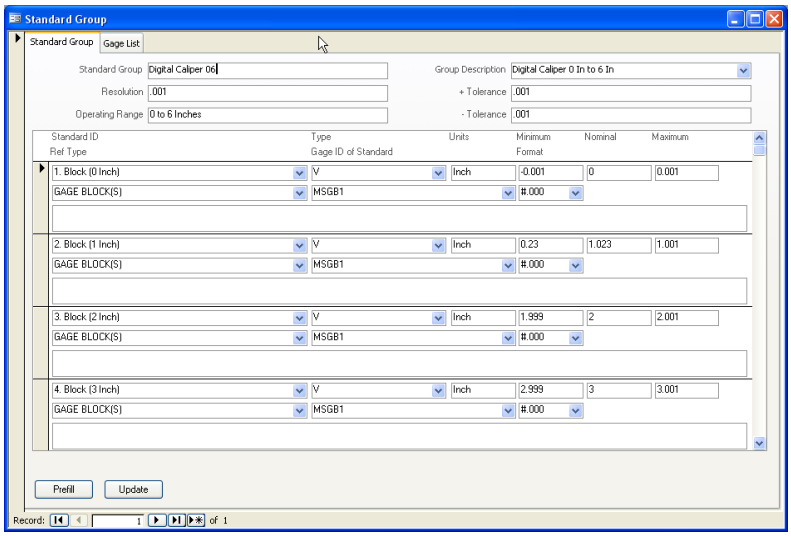


The table below describes the fields in this area:

Field/Button Name	Description
Gage ID	The ID of the selected gage will appear in this field.
Description	The description of the selected gage will appear in this field
User Defined	These fields can be used to store additional information and can be customized, the label names changed, and the Data Types altered, in Setup – Settings – Interface – Gage Custom
File	Path of file attachment. Selection of files is made easier by selecting the drilldown button to the right of the file field that brings up a *Locate File To Attach* dialog box for file selection. **Note: Verify that all users of this application have the ability to view the contents of this file. This includes both access to the directory where this file is stored and having sufficient network security rights to open this file.**
File Description	Description of attached file type. For example, if the attached file is a Microsoft Word document the Description field will contain Microsoft Word Document.
View/Print Button	Select this button to open the selected file with that file type application.
Delete Button	Highlight record indicator or click within the File field and select *Delete* from the floating toolbar.

Calibrations—Standard Group

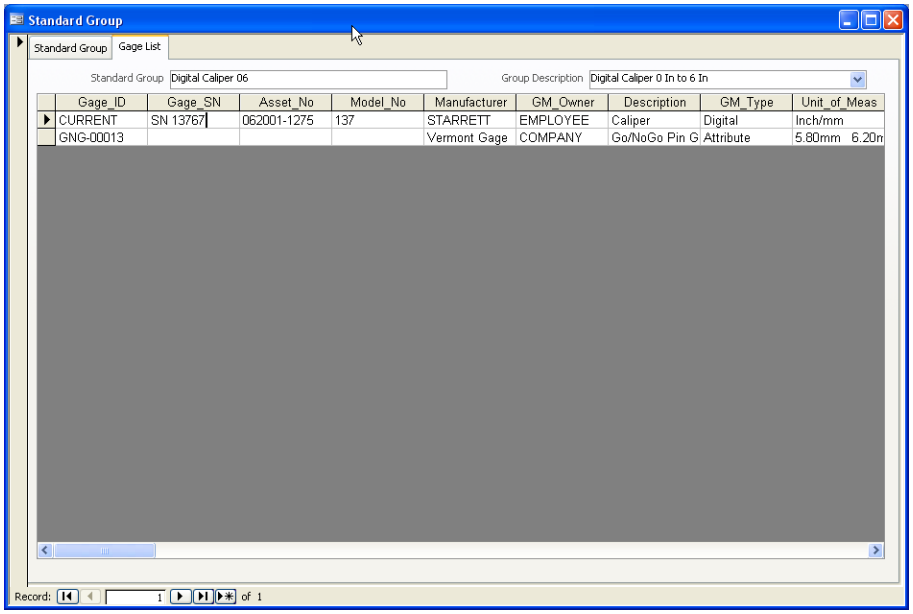
To enter calibration records, select Standard Group from the Calibration menu. Standard groups are defined using this menu. This is the basis of the drop-down list for Standard Group in the Gage Entry—Standards section.



Field/Button Name	Description
Standard Group	Enter the name of the standard group you wish to define.
Resolution	Enter the Resolution of the gage. This is the smallest (or least count) unit of motion that the gage is capable of measuring and displaying.
Operating Range	Enter the operation range for this gage.
Group Description	Enter a description for the group
+ Tolerance	Enter the Plus Tolerance for this standard group.
- Tolerance	Enter the Minus Tolerance for this standard group.
Prefill Button	If most of your measurements begin with the same numbers (such as 1.1651, 1.1650, and 1.1658), you can save time by prefilling the measurements with those digits. In this case, click the Prefill button, and then enter Number of Standards, Start (prefill) Value of 1.165, and Increment Value. Now you need to enter only the last digit of each measurement.
Update Button	Any gage using this standard group will be updated to the newly defined standard. **Note: Using the** Update **button will wipe out current standards, but will not effect standard history.**

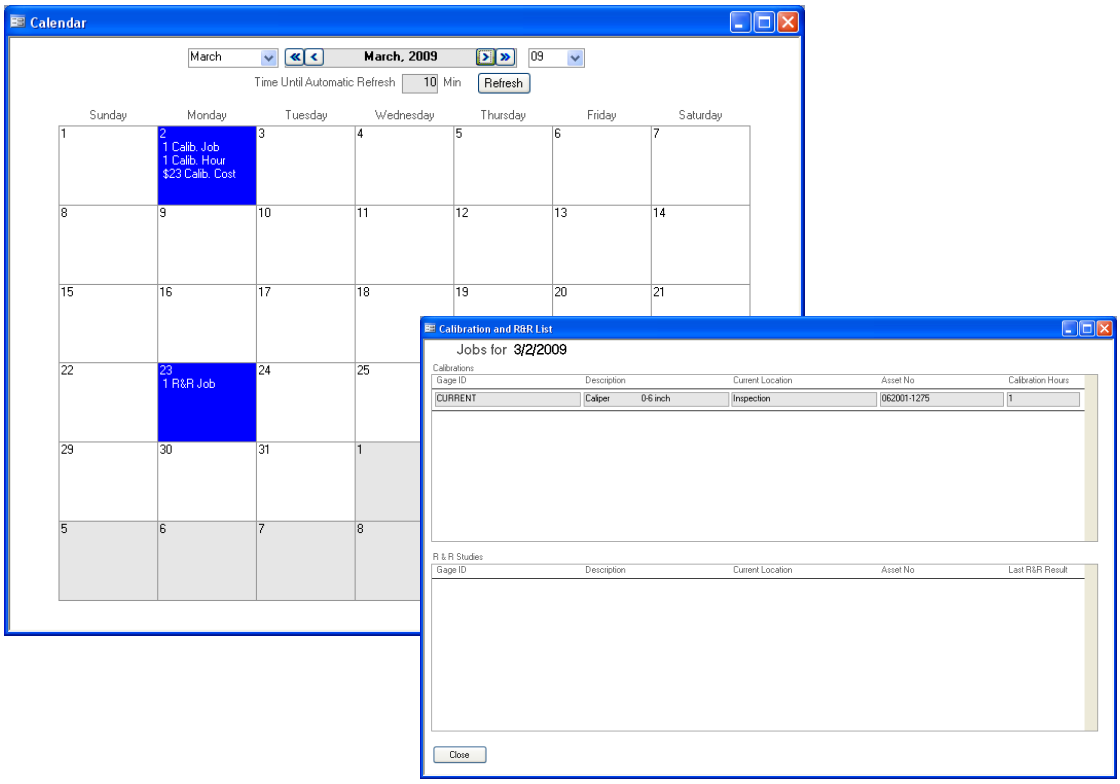
All criteria related to developing standards are the same as what is documented for Measurements in Calibration Entry.

Click on the Gage List tab to see a listing of all gages that use the selected standard group. You can use this listing to determine which gages will be affected if you modify the standard group. This list is not editable.



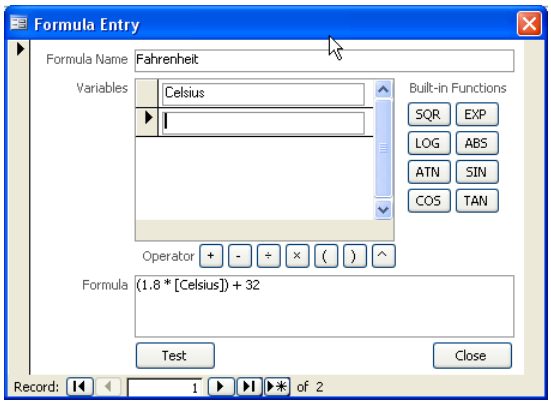
Calibration—Calendar

GAGEtrak has included a calibration calendar to view monthly calibration schedules in a single form. You can directly choose the month and year and go directly to a specific date and view the calibration schedule for the day. Click on any date to get an itemized Calibration and R&R List.



Calibration—Formula Entry

GAGEtrak has included a formula calculator with two (2) predefined formulas for your use. Additional formulas can be added and tested using the calculator, but Formula Entry only works with Calibration Entry.



The predefined formulas are:

Formula Name	Formula
Fahrenheit	(1.8 * [Celsius]) + 32
Celsius	([Fahrenheit] - 32) / 1.8

The Formula Entry form will allow the user to add and edit formulas. Each formula consists of simple mathematical expressions using the given variables enclosed in square brackets, arithmetic operators, etc. This functionality will parse the entered formula to produce the result. The user will be prompted to enter a numeric value for each variable when the Test formula button is clicked, (the formula computation is done when the Test button is clicked).

Chapter 12: MSA Entry

Overview

With MSA, you can assess your measurement systems using the statistical test procedures of *repeatability*, *reproducibility*, *bias*, *stability* and *linearity* (collectively referred to as “MSA” studies). This feature saves time and prevents the mistakes that you can make when you manually assess your measurement systems. You’ll soon find that it’s an essential tool for analyzing and managing your MSA studies.

This feature was designed for calibration technicians, metrologists, inspectors, and other quality control professionals who need a convenient, easy-to-use method for documenting, tracking, and performing measurement systems analysis. The software is based primarily on the techniques described in the AIAG MSA guide and other industry publications.

Before starting SPC, capability studies, or any type of repetitive measuring, use MSA to make sure that your measurement system can give you reliable measurements. Instructions for performing studies on your measurement system are given throughout this chapter.

About the Manual, Software, and Technical Support

The purpose of this guide is to help you learn how to *operate the software*. It’s not meant to be an authoritative guide on conducting, analyzing, and interpreting your gage MSA studies. Although this manual describes MSA study procedures, they are simply the views as documented by various industry publications.

The software is simply a tool used to store data, calculate results, and generate printed reports and charts. It does not determine whether a measurement system is *good* or *bad*. As the user, this determination is your sole responsibility.

> **Important: The technical support available for this software is limited strictly to the *operation of the software*. We cannot provide advice or support on interpreting results or charts. If you have interpretation questions, please consult your customer, a statistician, or other qualified professional.**

Validating the Software

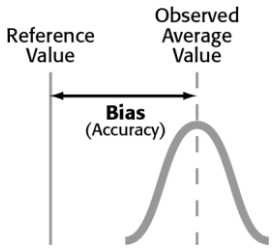
This software has been tested, validated, and deemed suitable for release. Calculation validations were conducted using test data with known results. However, you should still conduct your own validation tests using data with known results—those that you calculate by hand or proven published values. When comparing the software results to your manually calculated results, remember that you may find differences due to *rounding errors*. The software uses up to 17 significant digits of precision in all intermediate calculations, rounding only the final results.

Terms and Definitions

Before using the GRR Module, you may want to familiarize yourself with these terms.

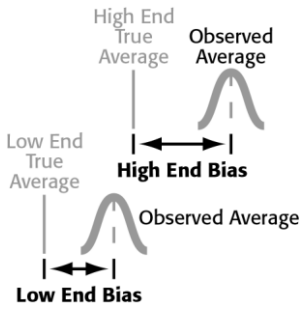
Bias

The difference between the observed average of measurements and the reference value is known as *bias* (sometimes called “accuracy,” however accuracy is a qualitative term that should be avoided when referring to bias). The reference value (accepted reference value or master value) functions as an agreed-upon reference for the measured values. You can determine a reference value by using a higher level of measuring equipment (such as metrology lab or layout equipment) to average several measurements.



Linearity

Linearity is the difference in the bias (accuracy) values through the gage’s estimated operating range.



Precision and Accuracy

Below, we'll use a bull's-eye target to describe the difference between *precision and accuracy*.

Accurate but not precise. Notice the readings are fairly well centered on the target, but there is wide scatter

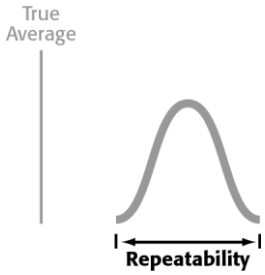
Precise but not accurate. You can see that the readings are all close to each other, but are not centered on the target.

Precise and accurate. In this, the best condition, the readings are all close to each other and centered on the target.

Precise and accurate are general qualitative terms that are not actually used in MSA studies.

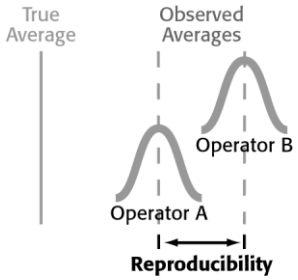
Repeatability (Equipment Variation)

Gage *repeatability* is the measurement variation that occurs when one appraiser uses the same gage to measure identical characteristics of the same parts.



Reproducibility (Appraiser Variation)

When different appraisers use the same gage to measure identical characteristics on the same parts, unexpected variation in the average of these measurements is known as gage *reproducibility*.

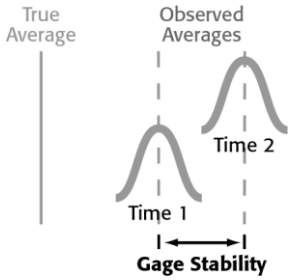


Appraiser × Part Interaction

When reproducibility error varies from part to part, that is called *Appraiser × Part Interaction*.

Stability

When using a measurement system to evaluate the same characteristic on a master or part over an extended period of time, the maximum change in bias is known as *stability uncertainty* (or drift).



Consistency

When using a measurement system to evaluate the same characteristic on a master or part over an extended period of time, the maximum change in repeatability is known as *consistency uncertainty* (or drift).

Variation Components

Equipment Variation (EV): Equipment Variation is an alternate term for repeatability, used primarily when we want to refer to repeatability by initials, (EV).

Appraiser Variation (AV): Appraiser Variation is an alternate term for reproducibility, used primarily when we want to refer to reproducibility by initials (AV). Although appraiser usually refers to an operator or technician, it can also mean different instruments, or different plant locations, etc., or all of the above.

Interaction (INT): Interaction is short for Appraiser × Part Interaction, used when we want to refer to it by initials. (INT)

Gage Repeatability and Reproducibility (GRR): Gage Repeatability and Reproducibility is the RSS (root-sum-square) sum of the equipment variation, appraiser variation, and interaction. Usually referred to as GRR, or GR&R, or Gage R&R.

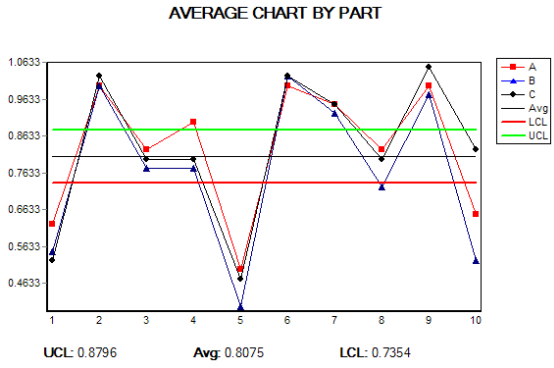
Part Variation (PV): The part variation is the part of the total GRR study error that is due to the parts being measured.

Total Variation (TV): The total variation is the RSS (root-sum-square) sum of the gage repeatability and reproducibility (including interaction, if available) and the part variation. Total variation is an estimate of process variation that can be used when process variation is unknown.

Ill*u*stration of Gage Errors

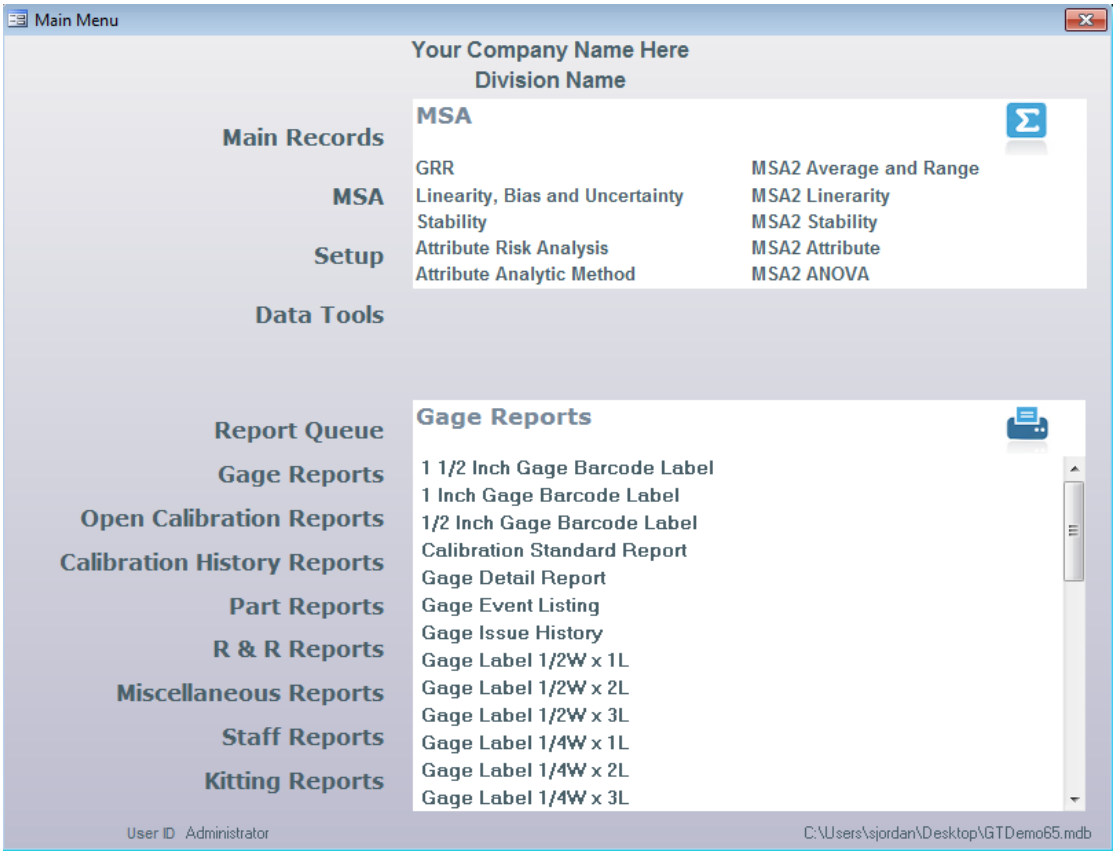
The chart below illustrates several terms we have discussed. The three zigzag patterns show the pattern of *Part Variation (PV)*, as measured by three different *Appraisers*. These patterns vary a lot more than the control limits, which is good (the control limits show the variation to be expected due to *Repeatability (EV)*, if we always measured the same part).

The three patterns are not close in height, which is an error called *Reproducibility (AV)*. The three patterns are not close in shape, which is an error called *Appraiser × Part Interaction (INT)*.



MSA Menu

Select MSA from the Main menu to access the MSA menu:



Click the menu button that corresponds to the study you want. We'll discuss each type of study next.

Tip: You can also run MSA by clicking the **MSA** button in the Calibration Entry screen. Running MSA this way restricts you to entering gage R&R studies for only the gage shown in the Calibration Entry screen.

GRR Module

GRR studies look at the ability of a calibrated gage to measure an actual part characteristic using real operators and production conditions. GRR studies are specific to a part characteristic and can apply to multiple gages.

Study Types

Analysis of Variance (ANOVA)

This method gives the most information. If GRR % of TV or Tol is unsatisfactory you will be able to view EV, AV, INT and PV for clues as to what should be done. This method is usually done with 2 or 3 Trials and 2 or 3 Appraisers and 10 parts.

Nested ANOVA Option

When this option is selected the program will assume non-replicable data where repetition takes place within a single group of parts rather than the same part, i.e., a row of trials are measurements on the same part group, but not actually the same part. For best results, within-group variation should be small (e.g., consecutive parts) and between-group variation should be large (e.g., different batches, lots, or time periods). INT is not calculated. If between-group (Part) variation is significant, you may be able to use regular ANOVA (also called crossed ANOVA); try it both ways, if you wish.

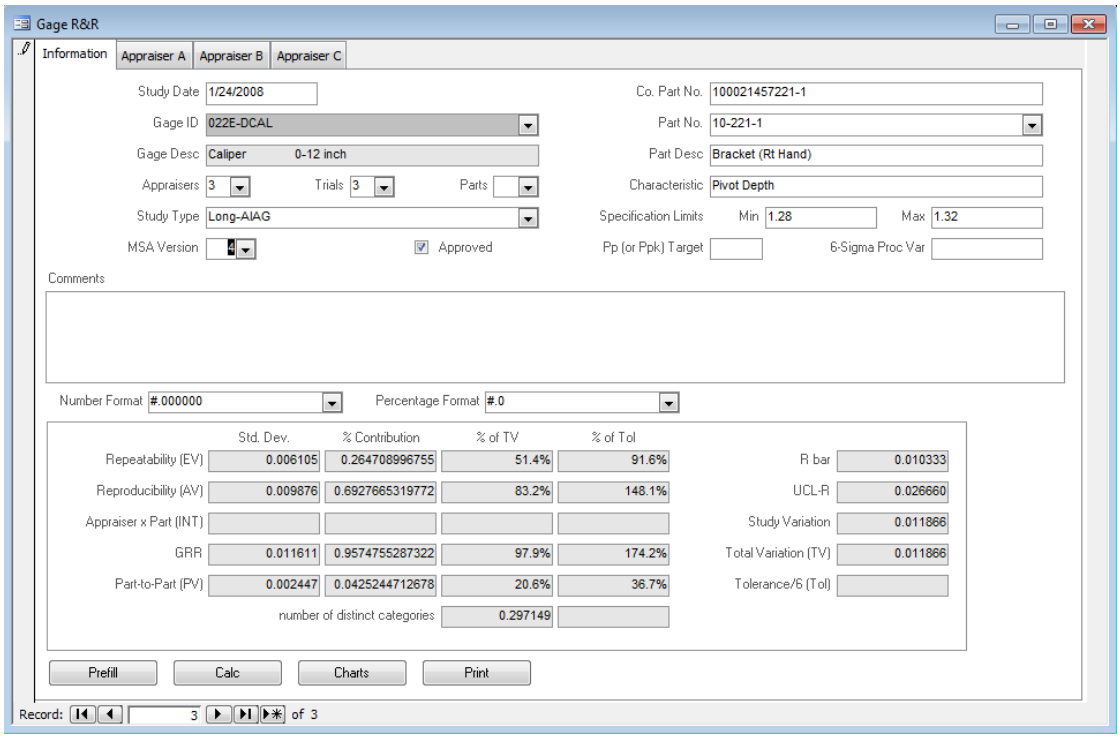
Average and Range Method (Long-AIAG)

This method is the most familiar (it became popular pre-computer, for its ease of calculation). If GRR % of TV or Tol is unsatisfactory you will be able to view EV, AV, and PV, but not INT, for clues as to what should be done. This method also requires 2 or 3 Trials and 2 or 3 Appraisers, and is usually done with 10 parts.

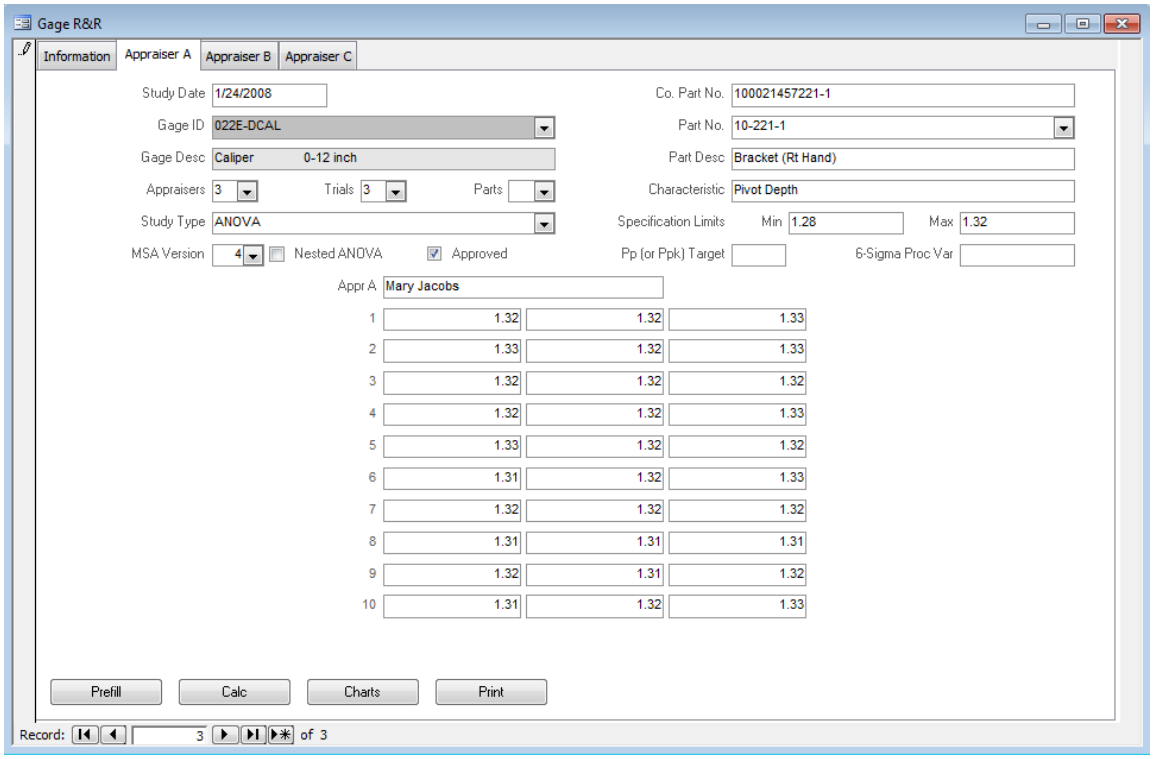
Range Method (Short -AIAG)

This method is quick and easy. IF GRR % of TV or Tol is unsatisfactory it provides no clues as to why not. PV and TV will be calculated only if you provide an external estimate of 6-sigma process variation or tolerance. This method is for one trial only, and is usually done with 5 parts and two appraisers.

Information Tab



When you are ready to start entering your R&R measurements, click the tab for Appraiser A and enter the appraisers name in the Appraiser A area. Next click your cursor in the first column for Part 1. After you enter the measurement, click the TAB or ENTER key and your cursor will be blinking in the area for the first measurement for Part 2. Subsequent clicking of the TAB or ENTER key after entering the measurements will advance you to all of the parts and all of the trials for Appraiser. Click the tabs for Appraiser B and Appraiser C (if required) and follow the same procedure.



Button Name	Description
Prefill	If most of your measurements begin with the same numbers (such as 1.1651, 1.1650, and 1.1658), you can save time by prefilling the measurements with those digits. In this case, click the Prefill button and then enter a *Prefill* value of 1.165. Now you need to enter only the last digit of each measurement. Before using *Prefill*, enter the number of trials appraisers and parts for the study.

GRR Study Screens

The table below explains each of the fields in the GRR screens:

Field Name	Description
Study Date	This field shows the date of the study (defaults to the current date).
Gage ID	Using the drop-down list box, select the ID of the gage.
Gage Desc.	This field shows the name of the gage or measurement device.
Appraisers	Select number of appraisers to be used for Prefill.
Trials	Select number of trials to be used for Prefill.
Parts	Select number of parts to be used for Prefill.
Study Type	Select ANOVA (preferred), Long AIAG or Short-AIAG.
MSA Version	Refers to the Measurement Systems Analysis Reference Manual published by AIAG. Use Version 4 for new studies. Existing Version 3 studies may be updated for new features by changing to Version 4. Updates are reversible.
Nested ANOVA	Appears only when ANOVA study type is selected. Select if trials are non-replicable.

Field Name	Description
Approved	Select when study is approved
Comments	Enter any comments you wish to note.
Number Format	Select the format you want for calculations.
Co. Part No.	You can enter your internal company part or job number in this field.
Part No.	Select a related part number, such as the customer or supplier part number.
Part Desc.	The description or name of the part appears in this field.
Characteristic	Enter the characteristic that you're evaluating in the study.
Specification Limits	Be sure to enter the minimum and maximum Specification Limit values; otherwise, the software can't calculate the %tolerance values for your study.
6-Sigma Proc. Var.	If you know the 6-Sigma Process Variation of the characteristic that you're measuring, enter it here. This causes the program to use this value instead of estimating part variation from your sample of study parts. If you know the standard deviation of the characteristic (from SPC or Capability studies), multiply it by six and enter the result here. See your Process Engineer, or Quality Engineer for help.
Pp (or Ppk) Target	A process capability or performance target may be entered (typically 1.33 or 1.67). GAGEtrak will use it to reduce Tolerance to be an estimate of Process Variation.

The program calculates these fields when you click the Calc button.

(Blank rows result if you used a Study Type that cannot calculate a particular row).

Row Name	Description
EV	Equipment variation (Repeatability)
AV	Appraiser Variation (Reproducibility)
INT	Appraiser × Part Interaction
GRR	Combined variation for EV, AV, and INT.
PV	Part-to-part Variation will be calculated and displayed from Total Variation TV. If Specification Limits have been entered, PV will be separately calculated for the % of Tolerance column. The latter version will display as % of Tol only.
Number of distinct categories	MSA 4th Edition authorizes using *number of distinct categories* as a substitute for GRR%. The two statistics are related in the same way that Fahrenheit and Celsius are two ways of measuring the same property. Technically, there is no reason to use both measures at the same time. See "Interpreting *number of distinct categories*" below for more information on how to interpret *number of distinct categories* and why some people might prefer one or the other.
R bar	The overall average range (relates to repeatability)
UCL-R	Upper Control Limit for the range control chart. (If the range chart is out of control there will be "flags" on the appraiser tabs to indicate likely typos or measurement mistakes).
Study Variation	Total Variation as calculated from the parts in the study. It will only match the Total Variation shown below if there was no entry in 6-Sigma Proc Var
Total Variation (TV)	If there is an entry in 6-Sigma Proc Var, it will be divided by 6 and entered here. Otherwise Study Variation will be used here. Total Variation represents 100% in the % of TV column.

Row Name	Description
Tolerance/6 (Tol)	If there is an entry in Pp Target then Tolerance will be calculated from the specification limits, divided by 6Pp, and entered here. Otherwise Tolerance will be divided by 6. Tolerance/6 represents 100% in the % of Tol column.

Column Name	Description
Standard Dev	Standard deviation (1σ, not 5.15σ) This is used for uncertainty calculations.
% Contribution	(Proportion of Total Variation)^2 This helps put things in perspective.
% of TV	Percent of Total Variation This is the primary comparison tool.
% of Tol	Percent of part Tolerance (based on 6σ, not 5.15σ). An alternate comparison tool

Interpreting GRR%

If you tend to think of gage improvement in terms of “reduced measurement variation” (reduced uncertainty), then you may prefer GRR% over *number of distinct categories*, because with GRR%, reduced numbers are better.

Most manufacturing companies follow the Automotive Industry Action Group (AIAG) rules. If GRR as a percentage of Total Variation (or % of Tolerance, whichever is more appropriate) is:

- Under 10% - the system is acceptable.
- Between 10% and 30% - you might need to further analyze the system to find the cause of the error.
- Over 30% - the system is not acceptable. You should perform further analysis on the system to find the cause of the error. If you use Long AIAG, you will be able to view EV, AV, and PV for clues as to what should be done. If you use ANOVA, You will be able to view EV, AV, INT, and PV for even more clues as to what should be done. It is important to also view the charts.

Interpreting number of distinct categories

If you tend to think of gage improvement in terms of “increased precision” (increased gage capability) then you may prefer *number of distinct categories* over GRR%, because with *number of distinct categories* increased numbers are better. *Number of distinct categories*,

as the name suggests, can be visualized as categories or cells of an imaginary histogram chart.

For every value of GRR%, there is a corresponding value of *number of distinct categories*, in a format that is roughly proportional to the reciprocal of GRR%. Technically, there is no reason to use both measures at the same time. Whichever format you prefer will provide equally complete information. The table below shows selected values of *number of distinct categories* and the corresponding values for GRR%.

Comparing *number of distinct categories* to GRR%:

number of distinct categories	4.5	5	10	14	20	28	35
GRR%	29.9%	27.1%	14.0%	10.0%	7.0%	5.0%	4.0%

Reject Limit for *number of distinct categories*

The usual reject limit for *number of distinct categories* is 5, which corresponds to 27%GRR. If you think it is important to have a reject limit that is closer to the AIAG specification limit of 30%GRR, then use *number of distinct categories* = 4.5 as a minimum.

Conversion Formula for *number of distinct categories*

The relationship is: *number of distinct categories* = $1.41((100/GRR\%)^2 - 1)^{0.5}$

For GRR% = 30, then *number of distinct categories* = $1.41((100/30)^2 - 1)^{0.5} = 4.48$

Note: This conversion formula is not used in GAGEtrak, but is presented here for information. If you want to verify the formula, just compare it to results in GAGEtrak.

Myths about *number of distinct categories*

1. Myth: By using the specified number of categories you can eliminate errors in sorting situations such as making a histogram. Fact: There is always significant probability of a one-category sorting error, because measurements and actual values can fall on opposite sides of a boundary. However, being off by two categories is highly unlikely with *number of distinct categories*. That is as good as it gets, but “error free” is an exaggeration.

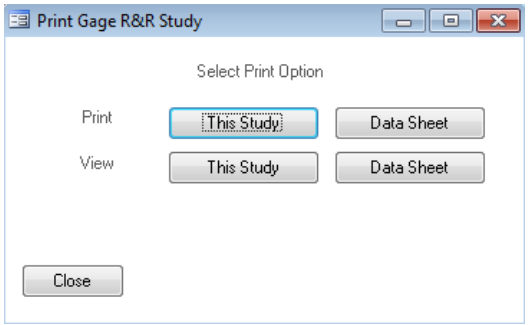
2. Myth: *Number of distinct categories* is at 97% confidence. Fact: *Number of distinct categories* is not related to any particular confidence level except when it is calculated based on tolerance. When based on tolerance/6 compared to GRR the confidence level is 99.73%. To see where ideas about 97% confidence (and truncation) started, look at the second part of the next paragraph.

Want to Sort with *number of distinct categories*?

To actually use the specified number of categories for sorting into a histogram you would need to choose a width for the categories. Since we now can calculate *number of distinct categories* from tolerance, you would likely prefer to round that value to an integer, and divide it into tolerance. The resulting category width would cover the entire tolerance. The authors that introduced *number of distinct categories* chose a (typically narrower) category width by truncating *number of distinct categories* to an integer, and dividing it into the equivalent of a 97% confidence interval for part variation (4.34 PV). Either category width would be suitable for practical use.

Printing the Study

To print the study, click the Print button, and a Print menu will appear, as shown here:

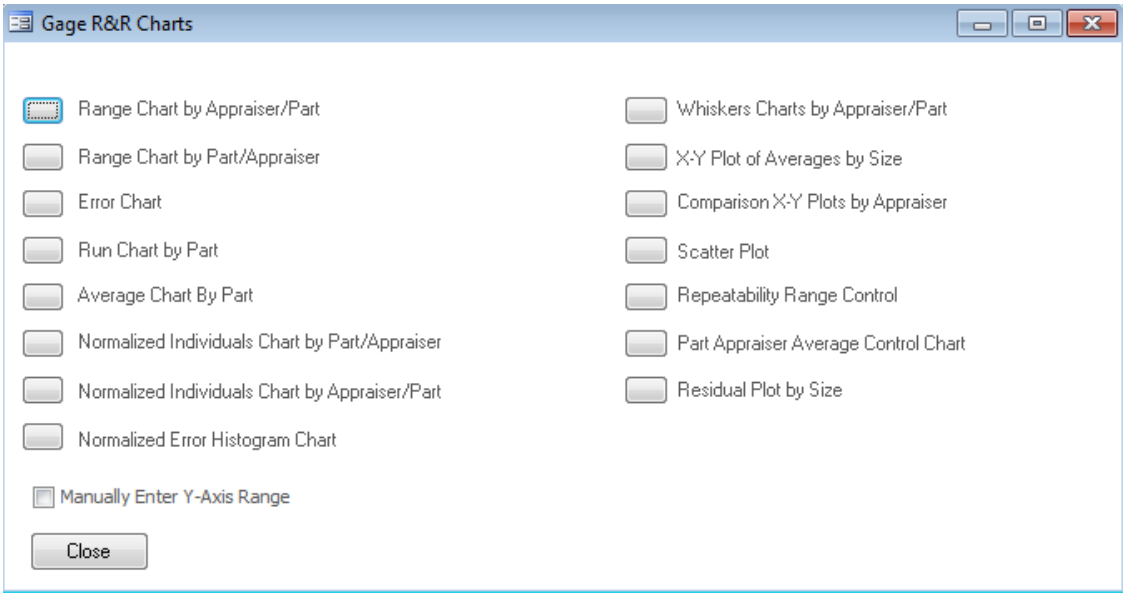


To print the study report, click the This Study button that's in the Print section. To preview the study report on-screen, click the This Study button that's in the View section. Use the Data Sheet buttons to print or preview a blank data collection sheet you can use to record measurements during the study.

If you want the two-page report (the second page is an analysis report that includes more detail), place a check in the Include Analysis Sheet checkbox.

Generating Charts

The GRR Module offers an extensive variety of charts to help you determine the causes of measurement error. To generate a chart from your Average and Range study, click the Charts button, and the Gage R&R Charts menu will appear:



Printing or Sending Charts

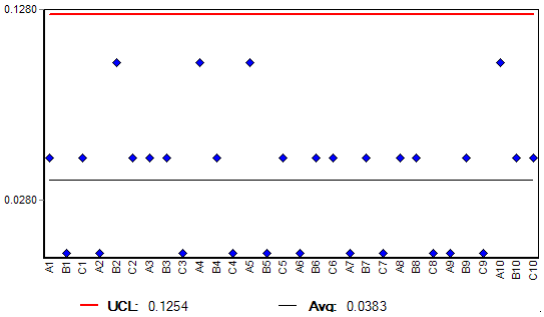
Each chart has a button for Print, and a button for Send (as an e-mail attachment). If you find that the calculate Y-Axis for the chart is not ideal for graphing your data, check Manually Enter Y-Axis Range before you click a chart button. This will allow you to determine the range used for that chart.

We'll discuss each type of chart next.

Range Chart by Appraiser/Part (and by Part/Appraiser)

Using a standard range chart, this chart plots the ranges of each appraiser's readings, including the average range and control limits. You can choose to plot the data grouped by part or grouped by appraiser.

Example Range Chart—Appraiser/Part



Range Chart Interpretation

The Range chart can help you determine both statistical control in regard to repeatability and homogeneity of the measurement process among appraisers for each part. Neither chart should show patterns in the data relative to the appraisers or parts. Out of control points on this particular chart usually indicate typos or measurement mistakes. The suspect data will be flagged on one of the Appraiser tabs.

Error Chart

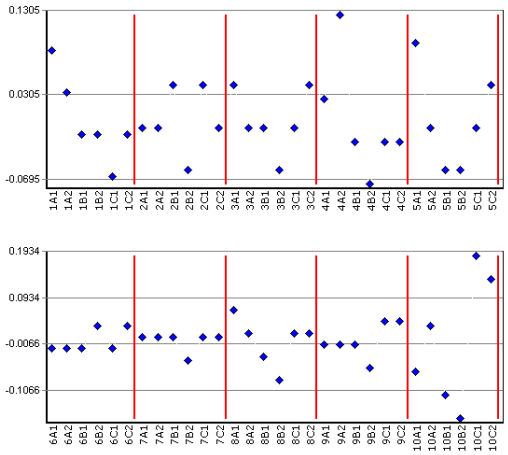
The Error chart shows the individual deviations from the accepted reference values. GAGEtrak calculates the individual deviation or error for each part according to the following formula:

Error = Observed Value – Average Measurement of the Part

Before you do any other statistical analysis, you should thoroughly screen the deviations for clear causes of variations that you can ascribe to specific factors.

Look for any uniform patterns in your Error chart, including the following: one appraiser's second (or third) set of readings is consistently higher than his first; one appraiser's average is higher than the other appraisers' averages; and/or one part standing out as more difficult to measure consistently.

Example Error Chart

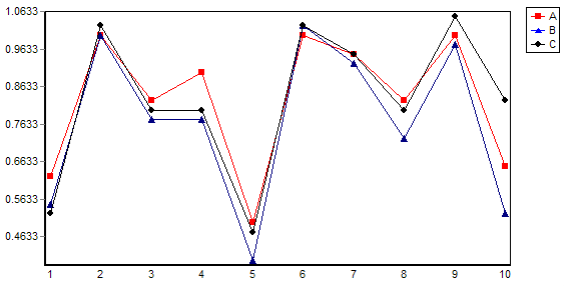


Run Chart and Average Chart

Run Chart by Part

This chart plots the averages of each appraiser's various readings, using part number as an index. The Run chart shows part variation and can detect reproducibility and appraiser × part interaction error.

Example Run Chart

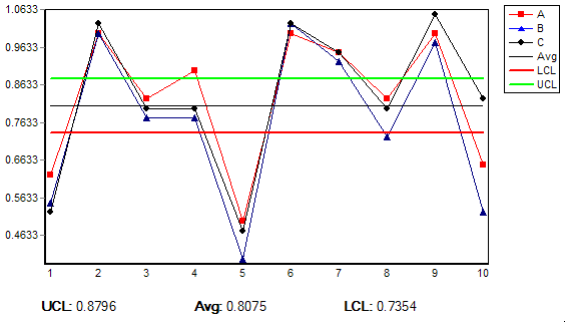


If the patterns are not at the same height there is a reproducibility error. If the patterns are not the same shape there is an appraiser × part interaction error

Average Chart by Part

The Average chart is much like the Run chart, except that it also calculates the overall average and control limits. From this chart, you can determine the measurement system's acceptability.

Example Average Chart

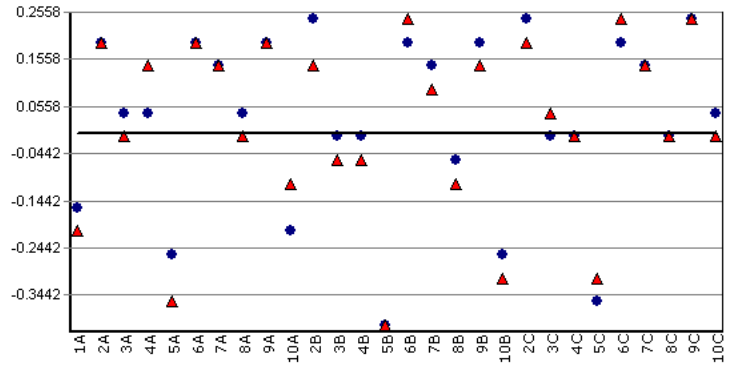


The three zigzag patterns show the pattern of *Part Variation (PV)*, as measured by three different *Appraisers*. These patterns vary a lot more than the control limits, which is good (the control limits show the variation expected due to *Repeatability (EV)*, as if we always measured the same part). The three patterns are not close in height, which is called *Reproducibility (AV)* error. The three patterns are not close in shape, which is called *Appraiser × Part Interaction (INT)*.

Normalized Individuals Chart (by Part/Appraiser and by Appraiser/Part)

In this chart, the plotted data consists of the individual readings minus the overall average of the readings. The normalized data is plotted grouped by appraiser or part number. This chart can help you determine reproducibility; consistency among appraisers; occurrences of abnormal readings; and the interaction between the parts and appraisers.

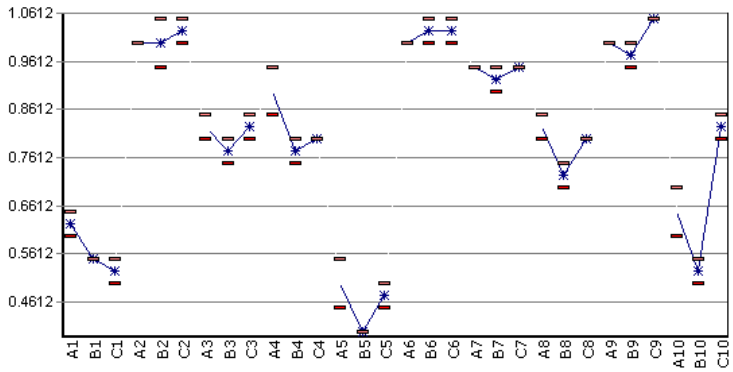
Example Normalized Individuals Chart



Whiskers Chart

The Whiskers chart plots and connects the high and low data values and the average by part by appraiser. This chart helps you see consistency among appraisers; occurrences of abnormal readings; and the interaction between the parts and the appraisers.

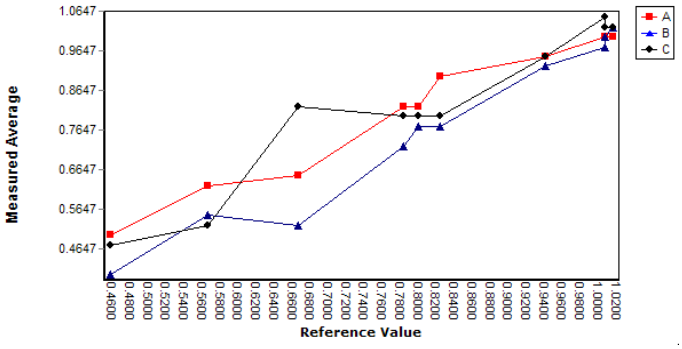
Example Whiskers Chart



X–Y Plot of Averages by Size

This chart plots the averages of each appraiser's various readings for each part, using the overall part average. If the appraisers disagree on certain parts (Appraiser × Part interaction) this can help to determine whether that depends on part size.

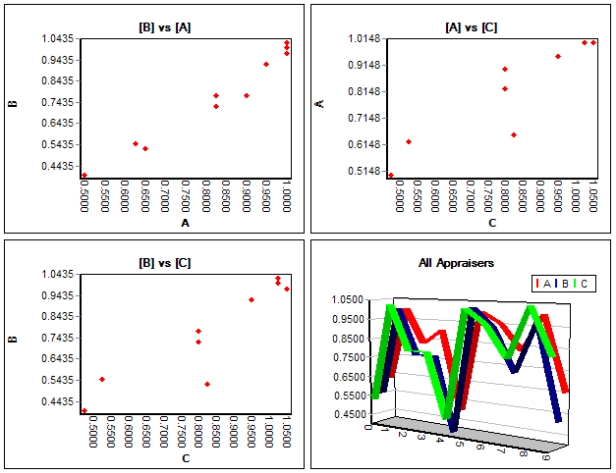
Example X–Y Plot—Averages by Size



Comparison X–Y Plots

In a Comparison X–Y Plot, the averages of each appraiser's readings on each part are plotted against each other, using appraiser as an index. This plot compares one appraiser's readings to those of another appraiser. If the appraisers' readings matched perfectly, the plotted points would form a diagonal straight line.

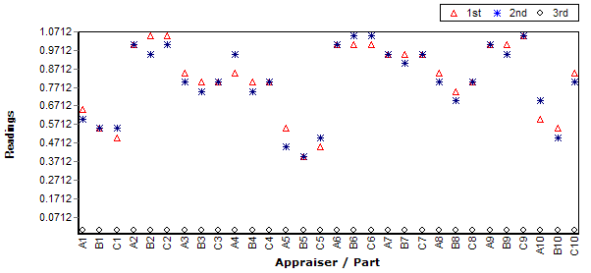
Example Appraiser Comparison X–Y Plots



Scatter Plot

The Scatter Plot charts individual readings by appraiser by part to help you determine consistency among appraisers; occurrences of abnormal readings; and the interaction between the parts and appraisers.

Example Scatter Plot



Repeatability Range Control Chart

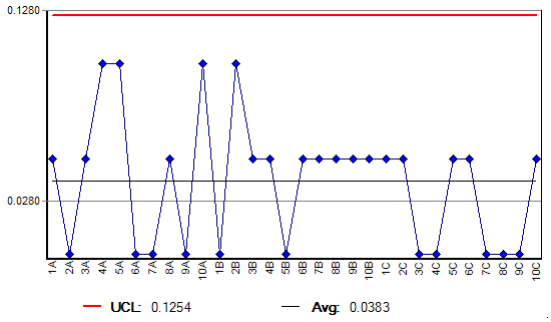
Using a standard range chart, this chart plots the ranges of the readings by each appraiser, for each part, including the average range and control limits. Appraiser groups the data, and lines connect the points for each appraiser.

Repeatability Range Chart Interpretation

The Range Control chart shouldn't show data patterns relative to the appraisers or have any out-of-control points. An *in-control* Range Control chart is a sign that the appraisers use the gage in the same way.

With the Range Control chart, you can determine whether repeatability is the same for all appraisers (the numerical methods do not answer this question).

Example Repeatability Range Control Chart

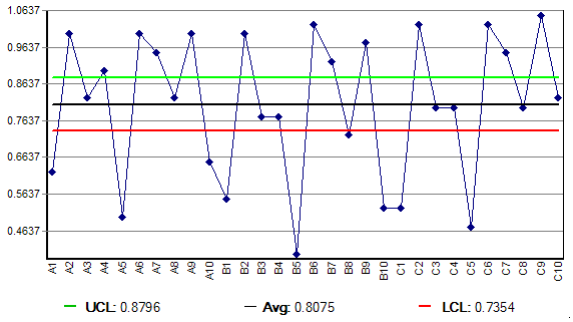


Part Appraiser Average Control Chart

Using a standard average chart, the averages of each appraiser's readings for each part are plotted, including the overall average and control limits. Appraiser groups the data with lines connecting each appraiser's points.

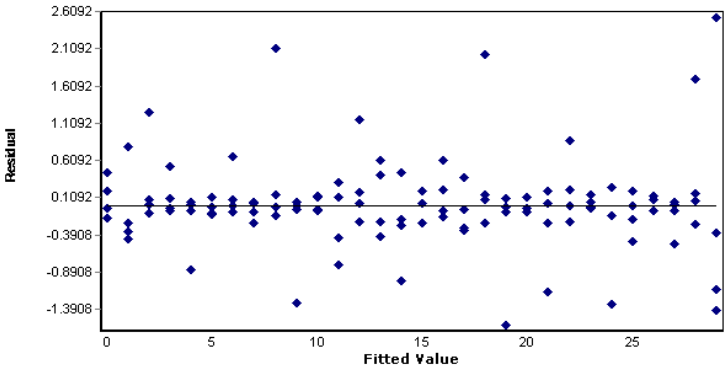
If half or more of the points are outside of the control limits, then the measurement system should be able to detect *part-to-part* variation. If less than half is outside the control limits, it might be because the measurement system isn't able to thoroughly distinguish differences or because the part sample doesn't represent the expected process variation.

Example Part Appraiser Average Control Chart



Residual Plot by Size

The averages of each appraiser's readings for each part are subtracted from each trial, and the residuals are plotted versus the overall part average. There should be no discernable patterns on this chart. Any visible pattern would suggest that something is wrong with the data, or the measuring system.



Average and Range Formulas

Range (Short Form) Method

Values of d_2^* for one trial

Parts	1	2	3	4	5	6	7	8	9	10
2 Appr's	1.41421	1.27931	1.23105	1.20621	1.19105	1.18083	1.17348	1.16794	1.16361	1.16514
3 Appr's	1.91155	1.80538	1.76858	1.74989	1.73857	1.73099	1.72555	1.72147	1.71828	1.71573

EV = Not calculated

AV = Not calculated

$$GRR = \frac{1}{d_2^*} \times \bar{R}$$

% GRR = 100 × GRR ÷ TV

or

%GRR = 100 × GRR ÷ (TOL ÷ 6)

where TV is (6□ Process Variation) ÷ 6

AIAG Average and Range Method (Long Form)

Note K_1, K_2, and K_3 are all equal to $1/d_2^*$

Equipment Variation (EV)—Repeatability

Trials	2	3
K_1	0.8862	0.5908

$$EV = \bar{R} \times K_1$$

$$\%EV = 100 \times (EV \div TV)$$

or, if comparing to tolerance:

$$\%EV = 100 \times EV \div (Tol \div 6)$$

Appraiser Variation (AV)—Reproducibility

Appr's	2	3
K_2	0.7071	0.5231

$$AV = \sqrt{\left[(\bar{X}_{diff} \times K_2)^2 - (EV^2 \div n \times r)\right]}$$

where n = # of parts, r = # of trials

Note: If a negative value results under the square root, the AV is reported as "0".

$$\%AV = 100 \times (AV \div TV)$$

or, if comparing to tolerance:

$$\%AV = 100 \times AV \div (Tol \div 6)$$

Repeatability & Reproducibility (R&R)

$$R\&R = \sqrt{(EV^2 + AV^2)}$$

$$\%GRR = 100 \times GRR \div TV$$

or, if comparing to tolerance:

$$\%GRR = 100 \times GRR \div (Tol \div 6)$$

Part Variation (PV)

Parts	2	3	4	5	6	7	8	9	10
K_3	0.7071	0.5231	0.4467	0.4030	0.3742	0.3534	0.3375	0.3249	0.3146

$$PV = R_p \times K_3$$

$$R_p = Max\ \bar{X}_p - Min\ \bar{X}_p$$

$\bar{X}_p$ values are the averages of each measured part

Note: If you know the 6-Sigma Process Variation (from SPC or Capability studies), enter it into the *Proc. Var.* field.

If entered into the Gage R&R Study form, the software will calculate TV as:

$$TV = (6\ Sigma\ Proc.\ Var. \div 6)$$

and calculate PV as:

$$PV = \sqrt{(TV^2 - R\&R^2)}$$

Total Variation (TV)

$$TV = \sqrt{R\&R^2 + PV^2}$$

ANOVA Formulas

Estimate of Variance Components

	Variance Estimate
Gage	$\tau^2 = MS_e$
Interaction	$\gamma^2 = \frac{(MS_{op} - MS_e)}{r}$
Appraiser	$\omega^2 = \frac{(MS_o - MS_{op})}{nr}$
Part	$\sigma^2 = \frac{(MS_p - MS_{op})}{kr}$

ANOVA Calculation

Source	**DF**	**SS**	**MS**	**F**	**EMS**
Appraiser	2	0.04800	0.02400		$\tau^2 + 2\gamma^2 + 20\omega^2$
Parts	9	2.05871	0.22875		$\tau^2 + 2\gamma^2 + 6\sigma^2$
Appraiser x Part	18	0.10367	0.00575	4.45*	$\tau^2 + 2\gamma^2$

Gage (Error)	30	0.03875	0.00129	τ^2
Total	*59*	*2.2491*		** Significant at α = 0.25 level*

Estimate of Variance	Std. Dev. (σ)
τ^2 = 0.00129 (Repeatability)	0.0359
ω^2 = 0.00091 (Operator)	0.0302
γ^2 = 0.00223 (Interaction)	0.0472
R&R = 0.00443 ($\tau^2 + \gamma^2 + \omega^2$)	0.0666
σ^2 = 0.0371641 (Part)	0.1928

Source: AIAG Measurement Systems Analysis Guide

Sample ANOVA Study

This section contains data and calculations for a sample ANOVA study. You can use this sample study as a model for your own ANOVA studies.

Readings

Appraiser A

Part	*Trial 1*	*Square*	*Trial 2*	*Square*	*Sum*	*Sum Square*
1	0.65	0.42	0.60	0.36	1.25	0.78
2	1.00	1.00	1.00	1.00	2.00	2.00
3	0.85	0.72	0.80	0.64	1.65	1.36
4	0.85	0.72	0.95	0.90	1.80	1.62
5	0.55	0.30	0.45	0.20	1.00	0.50
6	1.00	1.000	1.00	1.00	2.00	2.00
7	0.95	0.90	0.95	0.90	1.90	1.80
8	0.85	0.72	0.80	0.64	1.65	1.44
9	1.00	1.00	1.00	1.00	2.00	2.00
10	0.60	0.36	0.70	0.49	1.30	0.85
		7.14		7.13		
Total = 16.55						
SS Total = 14.27						

Appraiser B

Part	*Trial 1*	*Square*	*Trial 2*	*Square*	*Sum*	*Sum Square*
1	0.55	0.30	0.55	0.30	1.10	0.65

Part	*Trial 1*	*Square*	*Trial 2*	*Square*	*Sum*	*Sum Square*
2	1.05	1.10	0.95	0.90	2.00	2.00
3	0.80	0.64	0.75	0.56	1.55	1.20
4	0.80	0.64	0.75	0.56	1.55	1.20
5	0.40	0.16	0.40	0.16	0.80	0.32
6	1.00	1.00	1.05	1.10	2.05	2.10
7	0.95	0.90	0.90	0.81	1.85	1.71
8	0.75	0.56	0.70	0.49	1.45	1.05
9	1.00	1.00	0.95	0.90	1.95	1.90
10	0.55	0.30	0.50	0.25	1.05	0.55
		6.65		6.03		
Total = 15.35						
Sum Square Total = 12.63						

Appraiser C

Part	*Trial 1*	*Square*	*Trial 2*	*Square*	*Sum*	*Sum Square*
1	0.50	0.25	0.55	0.30	1.05	0.55
2	1.05	1.10	1.00	1.00	2.05	2.10
3	0.80	0.64	0.80	0.64	1.65	1.28
4	0.80	0.64	0.80	0.64	1.65	1.28
5	0.45	0.20	0.50	0.25	0.95	0.45
6	1.00	1.00	1.05	1.10	2.05	2.10
7	0.95	0.90	0.95	0.90	1.90	1.80
8	0.80	0.64	0.80	0.64	1.65	1.28
9	1.05	1.10	1.05	1.10	2.10	2.20
10	0.85	0.72	0.80	0.64	1.65	1.36
		7.19		7.21		
Total = 16.55						
Sum Square Total = 14.40						

Legend

AV = appraiser variation	k = number of appraisers
AV_{LCL} = appraiser variation lower control limit	LCL = lower control limit
AV_{ss} = appraiser variation sum square	MS_{ap} = appraiser x parts mean square
AV_{UCL} = appraiser variation upper control limit	MS_{err} = gage error mean square
CF = correction factor	MS_{p} = parts mean square
DF = degrees of freedom	n = number of parts
CHI = CHI probability distribution	PC = percent contribution
CHI_{INV} = inverse of CHI probability distribution	PV = part variation
DF = degrees of freedom	PV_{LCL} = part variation lower control limit
DF_{ap} = appraiser x parts degrees of freedom	PV_{SS} = part variation sum square
DF_{app} = appraiser degrees of freedom	PV_{UCL} = part variation upper control limit

DF_{err} = gage error degrees of freedom	r = number of trials
DF_p = parts degrees of freedom	R&R = repeatability & reproducibility
EV = equipment variation	RR_{LCL} = R&R lower control limit
EV_i = inverse of equipment variation	RR_{SS} = R&R sum square
EV_{LCL} = equipment variation lower control limit	RR_{UCL} = R&R upper control limit
EV_{SS} = equipment variation sum square	S^2 = sum square
EV_{UCL} = equipment variation upper control limit	SS_{ap} = appraiser x parts sum square
F_{INV} = inverse of F probability distribution	SS_{app} = appraiser sum square
F = F probability distribution	SS_{err} = gage error sum square
I = interaction	SS_p = parts sum square
I_{LCL} = interaction lower control limit	TV = total variation
I_{SS} = interaction sum square	TV_{SS} = total variation sum square
I_{UCL} = interaction upper control limit	UCL = upper control limit

Study Values

k = 3

n = 10

r = 2

Appraiser DF = k – 1

= 3 – 1

= 2

Parts DF = n – 1

=10 – 1

= 9

$$App. \times Parts = App.DF \times PartsDF$$

$$= 2 \times 9$$
$$= 18$$

$$TotalDF = (n \times k \times r) - 1$$
$$= (3 \times 10 \times 2) - 1$$
$$= 60 - 1$$
$$= 59$$

$$Gage(Error) = Tot_{DF} - A_{DF} - P_{DF} - AP_{DF}$$
$$= 59 - 2 - 9 - 18$$
$$= 30$$

Sum All Readings

16.55 + 15.35 + 16.55 = 48.45

Sum Square All Readings

273.90 + 235.62 + 273.90 = 783.42

Parts	Sum	Square
1	3.40	11.56
2	6.05	36.65
3	4.80	23.04
4	4.95	24.50
5	2.75	7.56
6	6.10	37.21
7	5.65	31.92
8	4.70	22.09
9	6.05	36.65
10	4.00	16.00
Totals	48.45	247.08

Correction Factor for ANOVA

$$CF = (SumReadings)^2 \div n \div k \div r$$
$$= 48.45^2 \div 10 \div 3 \div 2$$
$$= 39.123$$

Appraiser Sum Square

$$SS_{app} = (SSReading \div n \div r) - CF$$
$$= (783.42 \div 10 \div 2) - 39.123$$
$$= 0.048$$

Appraiser Mean Square

$$= SS_{app} \div DF_{app}$$
$$= 0.048 \div 2$$
$$= 0.024$$

Parts Sum Square

$$SS_p = (PartsSumSquare \div k \div r) - CF$$
$$= (247.08 \div 3 \div 2) - 39.123$$
$$= 2.057$$

Parts Mean Square

$$MS_p = SS_p \div DF_p$$
$$= 2.124 \div 9$$
$$= 0.2286$$

App. × Parts Sum Square

$$SS_{ap} = (SumSquareTotalReadings \div r) - CF - SS_p - SS_{app}$$
$$= (82.668 \div 2) - 39.123 - 2.057 - 0.048$$
$$= 0.106$$

App. × Parts Mean Square

$$MS_{ap} = SS_{ap} \div DF_{ap}$$
$$= 0.106 \div 18$$
$$= 0.0059$$

Gage Error Sum Square

$$SS_{err} = (SumSquareAll - CF) - SS_{ap} - SS_p - SS_{app}$$
$$= (41.373 - 39.123) - 0.106 - 2.057 - 0.048$$
$$= 0.039$$

Gage Error Mean Square

$$MS_{err} = SS_{err} \div DF_{err}$$
$$= 0.039 \div 30$$
$$= 0.0013$$

$$F\ Value = MS_{ap} \div MS_{err}$$
$$= 0.0059 \div 0.0013$$
$$= 4.5385$$

$$F_{0.25} = (from F\ Table)$$
$$= 1.310$$

ANOVA Table

Source	DF	SS	MS	F	$F_{0.25}$
Appraiser	2	0.048	0.024		
Parts	9	2.057	0.2286		
App. × Parts	18	0.106	0.0059	4.5385	1.310
Gage Error	30	0.039	0.0013		
Total	59	2.249			

Components of Variance

Most of these values are calculated using values from an F-distribution table. You can find F-tables in most statistics manuals.

Sum Squares

$AV = (MS_{app} - MS_{ap}) \div (nr)$ $EV = MS_{err}$

$PV = (MS_{p} - MS_{ap}) \div (kr)$ $R\&R = AV_{ss} + I_{ss} + EV_{i}$

$I = (MS_{ap} - MS_{grr}) \div r$ $TV = RR_{ss} + PV_{ss}$

Table	S^2
AV	0.00091
PI	0.03716
I	0.00223
EV	0.00129
RR	0.00444
TV	0.04165

Study Variation

$$\begin{aligned} TV &= \sqrt{TV_{ss}} \\ &= \sqrt{0.0416} \\ &= 0.204 \end{aligned}$$

Repeatability

$$\begin{aligned} EV &= \sqrt{EV_{ss}} \\ &= \sqrt{0.00129} \\ &= 0.0359 \end{aligned}$$

$$\begin{aligned} \%TV &= (\text{Rep. Std. Dev.} \div \text{Study Variation}) \times 100 \\ &= (0.0359 \div 0.204) \times 100 \\ &= 17.6\% \end{aligned}$$

Reproducibility

$$\begin{aligned} AV &= \sqrt{AV_{ss}} \\ &= \sqrt{0.00091} \\ &= 0.0302 \end{aligned}$$

$$\begin{aligned} \%TV &= \text{Std. Dev.} \div TV \\ &= 0.0302 \div 0.204 \\ &= 14.8\% \end{aligned}$$

Part × Appraiser

$$\begin{aligned} INT &= \sqrt{I_{ss}} \\ &= \sqrt{0.00223} \\ &= 0.0473 \end{aligned}$$

$$\begin{aligned} \%TV &= \text{Std. Dev.} \div TV \\ &= 0.0473 \div 0.204 \\ &= 23.2\% \end{aligned}$$

GRR

$$GRR = \sqrt{RR_{ss}}$$
$$= \sqrt{0.00444}$$
$$= 0.0666$$
$$\%TV = \text{Std. Dev.} \div TV$$
$$= 0.0666 \div 0.204$$
$$= 32.7\%$$

Part to Part

$$PV = \sqrt{PV_{ss}}$$
$$= \sqrt{0.03716}$$
$$= 0.1928$$
$$\%TV = \text{Std. Dev.} \div TV$$
$$= 0.1928 \div 0.204$$
$$= 94.5\%$$

Linearity, Bias and Uncertainty

Linearity & Bias Study

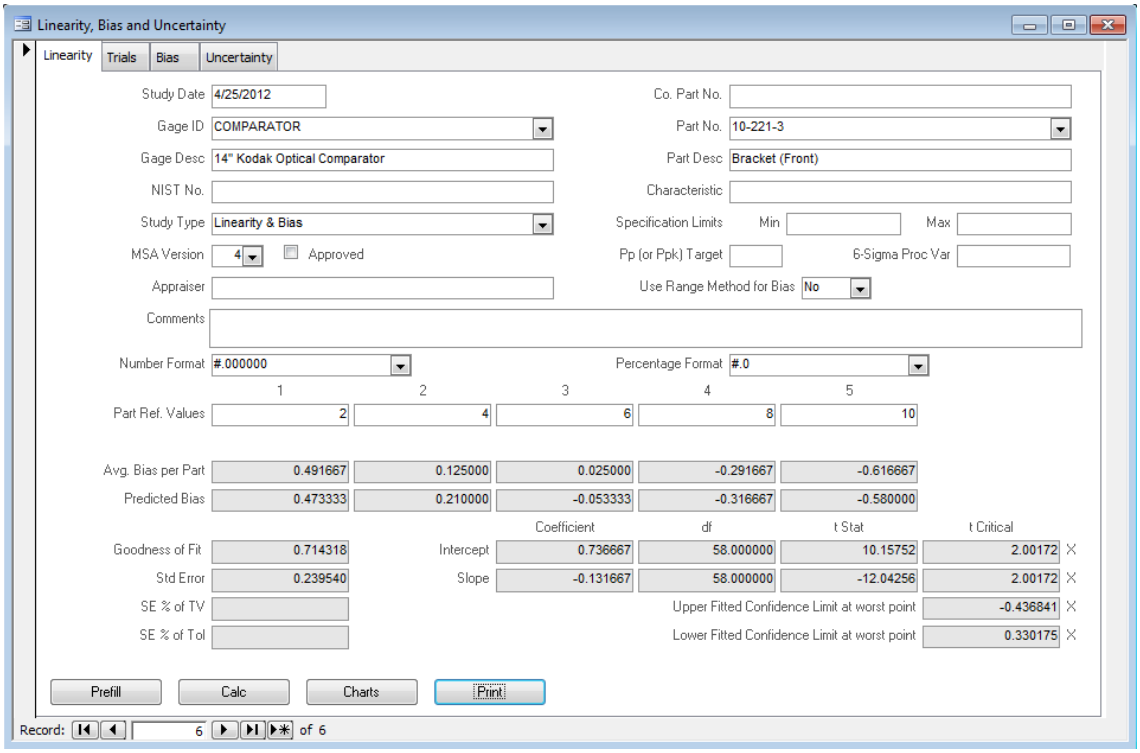
Linearity studies measure multiple reference standards throughout the operating range of the gage. Typically, bias is determined at five different reference values. Ideally, bias will appear to be slightly above or below zero at each of the five reference values. If bias is found to vary significantly from zero, the study will tell us whether it varies in a linear way (easy to compensate for) or a non-linear way (more difficult to compensate for). Some gages are calibrated with custom-made masters, and there are only one or two reference standards. If you don't have at least three reference standards, you can do the study using "calibrated" parts, e.g., have the parts measured by a more authoritative instrument such as a coordinate measuring machine. Then each part will have a reference value. If enough reference standards are available, it is better not to use parts.

If a linearity study is to represent an entire family of gages, you may want to use a different gage for each reference value. Then the repeatability of calibration will actually be GRR of calibration because it will include appraiser variation. (Appraiser variation can refer to gages, operators, or laboratories) You could even use two technicians, by letting each do half of the trials.

Bias Only Study

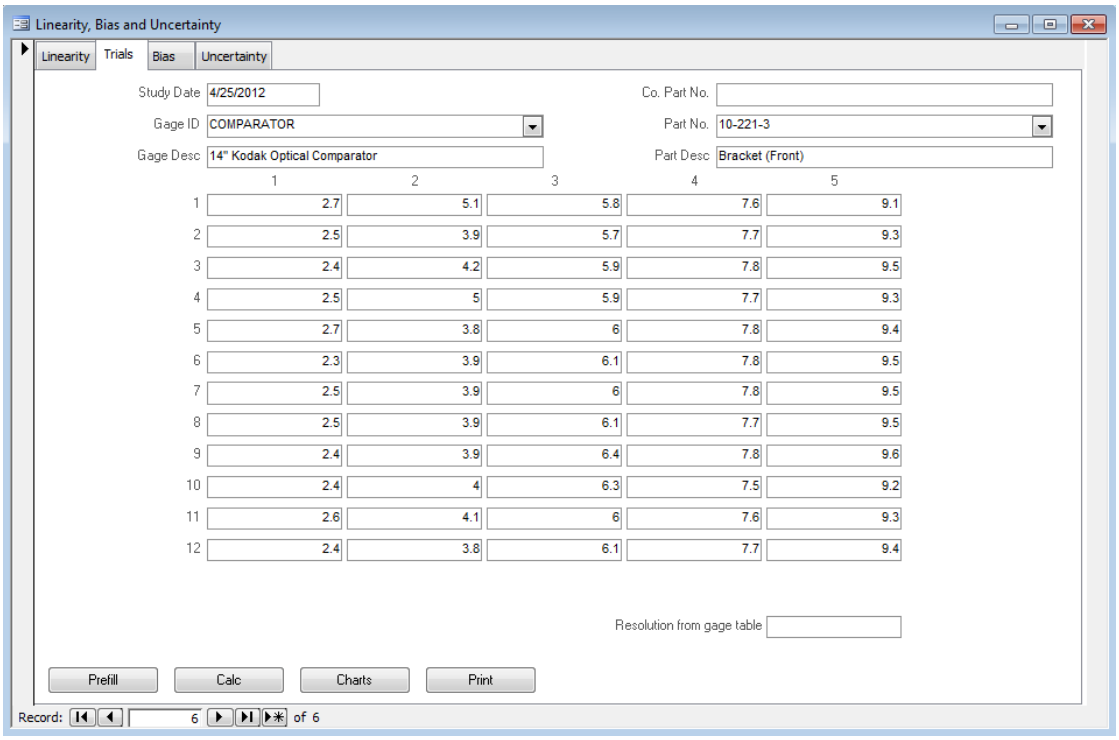
When you only want to check bias at a single reference value, select on the Linearity tab, Bias Only for study type. (You will still be able to do Uncertainty, except for the Linearity contribution).

Linearity



Enter three to five reference values in the Part Ref. Values area. The smallest reference values should be entered as 1 and the largest reference values entered as 5. Click the Trials tab to begin entering the measurements for each size. Start with Column 1. Click the TAB or ENTER key to advance to the next measurement for Column 1 until all 12 measurements have been entered. Follow the same procedure for the rest of the columns.

Trials Tab


Linearity, Bias and Uncertainty
Linearity
Trials
Bias
Uncertainty
Study Date 4/25/2012
Co. Part No.
Gage ID COMPARATOR
Part No. 10-221-3
Gage Desc 14" Kodak Optical Comparator
Part Desc Bracket (Front)
1 2 3 4 5
1 2.7 5.1 5.8 7.6 9.1
2 2.5 3.9 5.7 7.7 9.3
3 2.4 4.2 5.9 7.8 9.5
4 2.5 5 5.9 7.7 9.3
5 2.7 3.8 6 7.8 9.4
6 2.3 3.9 6.1 7.8 9.5
7 2.5 3.9 6 7.8 9.5
8 2.5 3.9 6.1 7.7 9.5
9 2.4 3.9 6.4 7.8 9.6
10 2.4 4 6.3 7.5 9.2
11 2.6 4.1 6 7.6 9.3
12 2.4 3.8 6.1 7.7 9.4
Resolution from gage table
Prefill
Calc
Charts
Print
Record: 6 of 6

The Linearity and Trials Tabs contain these fields:

Field/Button Name	Description
Study Date	Enter the date of the study; this field defaults to the current date.
Gage ID	Select the gage ID from the drop-down list box.
Gage Desc	The name of the gage or measurement device appears in this field.
NIST No	A number, traceable to NIST, for the reference standards or calibrated parts to be measured.
Study Type	Choose Linearity & Bias, if you have 3 to 5 reference values. If there is only one reference value, choose Bias Only.
MSA Version	Refers to the Measurement Systems Analysis Reference Manual published by AIAG. Use Version 4 for new studies. Existing Version 3 studies may be updated for new features by changing to Version 4. Updates are reversible.
Approved	Select if study is approved.
Appraiser	Enter the name of the person conducting the study.
Comments	Use this field to enter any comments about this study.
Co Part No.	Enter your internal company reference standard, part or job number, if relevant.
Part No.	Select a related reference standard or part number, such as the customer or supplier part number, if relevant.
Part Desc	This field displays the description or name of the reference standard or part.
Characteristic	In this field, enter the name of the characteristic you measured.

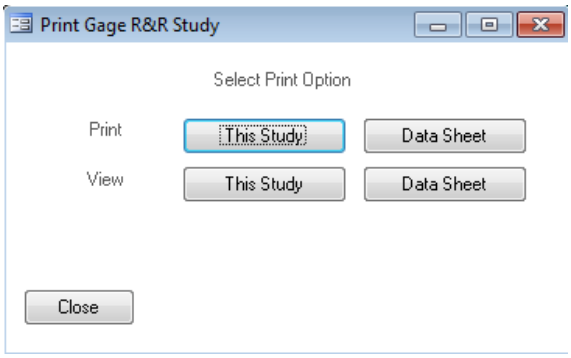
Field/Button Name	Description
Specification Limits	Be sure to enter the minimum and maximum Specification Limit values; otherwise, the software can't calculate the % tolerance values for your study.
Pp (or Ppk) Target	A process capability or performance target may be entered (typically 1.33 or 1.67). GAGEtrak will use it to reduce Tolerance to be an estimate of Process Variation.
6-Sigma Proc. Var.	If you know the 6-Sigma Process Variation of the characteristic that you're measuring, enter it here. It will be divided by 6 and used for Total Variation TV.
Use Range Method for Bias	If you want this option, select Yes from the drop down list. Otherwise, GAGEtrak uses standard deviation.
Number Format	Choose desired format from the drop down list.
Percentage Format	Choose desired format from the drop down list.
Part Reference Values 1–5 (required)	Enter three to five Part Reference Values for Linearity & Bias. Enter one for Bias Only Studies.
Trials 1-12 or 1-60 (required)	Enter 5 to 12 for each reference value or 5 to 60 for Bias Only studies (required).

Linearity Analysis Fields

Field Name	Description
Average Bias per Part	Average Bias for each reference value. Click the calc button to see this.
Predicted Bias	The Bias predicted by the regression line. Click the calc button to see this.
Goodness of Fit	A measure of how well the regression line fits the data points, on a scale of 0 to 1. Values near 1 fit well. Values near 0 fit poorly. (In case of poor fit, the data must be evaluated graphically rather than numerically).
Std Error	The standard deviation of the regression (not the raw data).
SE % of TV	The Standard Error divided by Total Variation. If this is large it can cause false acceptance of statistical tests.
SE % of Tol	The Standard Error divided by Tolerance/6. If this is large it can cause false acceptance of statistical tests.
Intercept	A coefficient of the regression equation, equal to predicted bias when the reference value is zero (assuming the gage were capable of measuring zero).
Slope	A coefficient of the regression equation, equal to the change in bias per unit of change in reference value.
Coefficient	Both Intercept and Slope are called Coefficients of the regression equation (Predicted Bias = b + a × Reference Value). Where a = Slope, and b = Intercept.
DF	Degrees of Freedom (sample size –2) used to determine t critical.
t Stat	Each coefficient is converted to a "t Statistic" so it can be compared to t Critical.
t Critical	A 95% two-sided confidence limit for the t distribution. When the absolute value of either t Statistic is larger than t Critical, the corresponding error is not acceptable.

Field Name	Description
Upper Fitted Confidence Limit at worst point	May not be less than zero.
Lower Fitted Confidence Limit at worst point	May not be greater than zero.

Printing the Linearity Study



To print the study report, click the This Study button that's in the Print section. To preview the study report on-screen, click the This Study button that's in the View section. Use the Data Sheet buttons to print or preview a blank data collection sheet you can use to record measurements during the study.

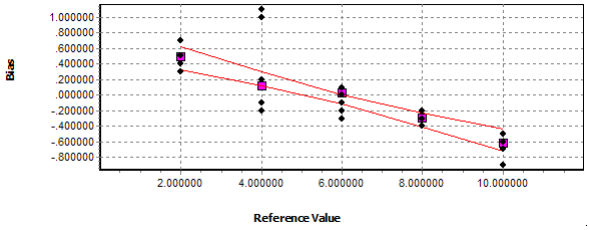
Viewing, Printing, and Sending Charts

Click on the Chart button, and choose Linearity Chart, or Histogram. Each chart has a button for Print, and a button for Send (as an email attachment). We'll discuss each type of chart next.

Linearity Chart

To generate a Linearity chart, click on the Chart button. You'll see a plot of individual and average Bias versus Reference Value, as well as a best-fit linear regression line and bow-tie-shaped confidence limits. To be acceptable, the zero Bias line must fit within the confidence limits.

Example Linearity Chart



Histogram

The Histogram is discussed under *Bias Tab*.

Linearity Study Interpretation

The Goodness of Fit value (R^2) of the linear regression line determines whether the biases and reference values have a good linear relationship. This value will be a number between 0 and 1; the closer it is to 1, the better the linear relationship.

You can also evaluate goodness of fit by looking at the chart. If the fit is adequate then apply three criteria:

1. The horizontal zero bias line on the chart should fit within the confidence limits.
2. The absolute value of the t Statistic for Slope should not be larger than t Critical.
3. The absolute value of the t Statistic for Intercept should not be larger than t Critical.

If the regression line does not fit well, do not apply the above criteria. Study the chart for evidence of non-linearity. Non-linearity can be acceptable if bias per part is always near zero.

If a measurement system has significant linearity error, look for these possible causes:

1. Gage not calibrated properly at lower and upper ends of the operating range
2. Error in the minimum or maximum master
3. Worn instrument
4. Internal instrument design characteristics

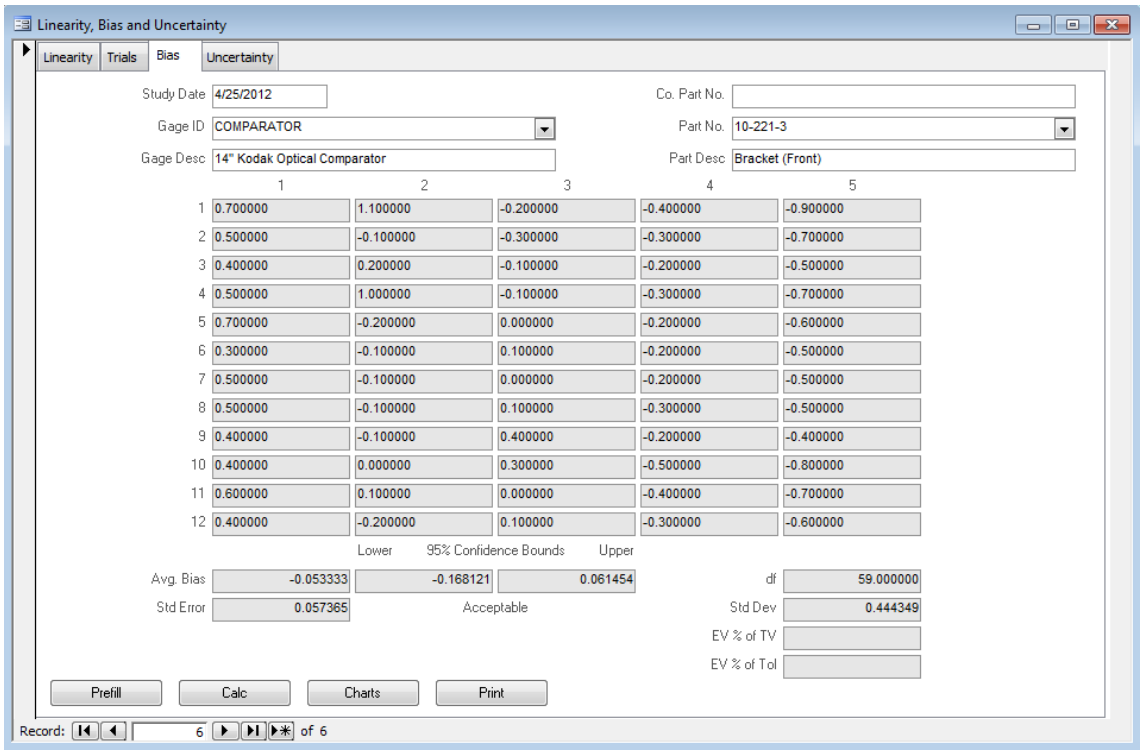
5. Mistakes in measurement or typos.

If there is significant linearity error that cannot be eliminated you may be able to use the gage by using the regression equation to correct future measurements. In the automotive industry this requires customer permission.

Bias Tab

This tab analyzes the bias for Linearity & Bias, as well as Bias Only Studies. Enter Study Type and Part Reference values on the Linearity tab, and then enter data in the Trials tab before coming to the Bias tab.

Note: Bias studies using the control chart method are part of the Stability Module and are not included in this module.



The Bias tab calculates the following fields:

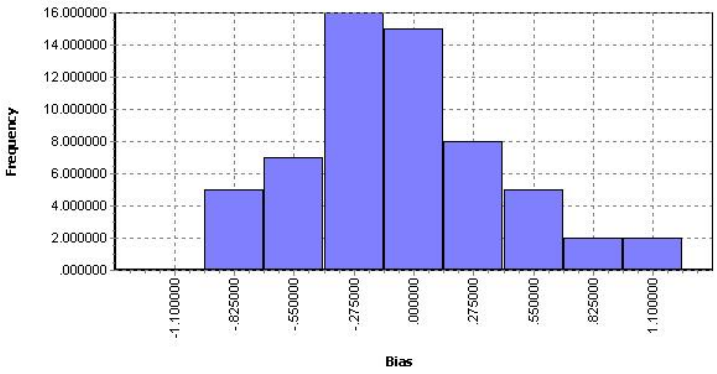
Field/Button Name	Description
1-12 or 1-60	Individual Bias estimates for each trial in the study. For a Linearity and Bias study they are labeled 1-12 in each of 5 columns. For a Bias Only Study they are labeled 1-60.
Avg Bias	The average of all the Bias estimates.
Std Error	The standard deviation of Average Bias.

Field/Button Name	Description
Lower	The Lower 95% Confidence Limit. (Must not be greater than zero).
Upper	The Upper 95% Confidence Limit. (Must not be less than zero).
DF	Degrees of Freedom
St Dev	Standard Deviation, the variability of the individual Bias estimates.
EV % of TV	Equipment Variation (Standard Deviation) divided by Total Variation. If this is large it can cause false acceptance of statistical tests.
EV % of Tol	Equipment Variation (Standard Deviation) divided by Tolerance/6. If this is large it can cause false acceptance of statistical tests.

Histogram

This chart is used to show the central tendency, spread, and shape of the distribution of Bias values.

Example Histogram



Interpretation of Bias Tab

To be acceptable the lower 95% confidence limit must not be greater than zero and the upper 95% confidence limit must not be less than zero. If not acceptable then the Histogram may identify outliers or patterns that provide clues. Possible causes are:

1. Gage not calibrated properly at lower and upper ends of the operating range
2. Error in the minimum or maximum master
3. Worn instrument
4. Internal instrument design characteristics
5. Mistakes in measurement or typos

Uncertainty Tab

Uncertainty refers to the potential variation of gage error that accumulates in the chain of calibrations from NIST through various intermediate calibration labs to the final calibration of a “working gage” and its use in a production environment. At each intermediate stage of calibration the uncertainty increases because the input uncertainty will be combined with new uncertainty contributors to create an output uncertainty that is always larger. Each uncertainty along the way is communicated to the next link in the chain by a calibration certificate or test report. Each certificate maintains “traceability” to the original NIST calibration by citing the NIST number. This system of traceability is important because, without it uncertainty would inevitably grow to the point where customers and suppliers could not trust each other’s measurements.

To quote from ISO17025:

> **Reasonable estimation [of uncertainty] shall be based on knowledge of the performance of the method and on the scope and shall make use of, for example, previous experience and validation data. Sources contributing to the uncertainty include, but are not necessarily limited to, the reference standards and reference materials used, methods and equipment used, environmental conditions, properties and condition of the item being tested or calibrated, and the operator.**

The uncertainty contributors to be included are selected on the basis of judgment and knowledge of the measurement method. Items selected are designated as “Type A,” which means derived from an MSA study, or “Type B,” which means some other source such as a certificate, or an experience-based educated guess.

Keep in mind that uncertainty is not an estimate of gage error; it is the potential variability in gage error, i.e., the extent to which gage error is unknown.

Here are some examples of potential uncertainty contributors, and where they come from. This is not an exhaustive list.

Uncertainty of Calibration (Type A)

Uncertainty Contributors	Where Available
Linearity	This Module

Uncertainty Contributors	Where Available
Bias	This Module or the Stability Module
Resolution	This Module or the Stability Module
Repeatability or GRR	This Module or the Stability Module
Stability (of the reference standard)	Stability Module (if the reference standard is a variable gage)
Consistency (of the reference standard)	Stability Module (if the reference standard is a variable gage)
Hysteresis	This is a side study, similar to linearity, but easy to do manually.

Uncertainty of Measurement (Type A)

These apply to working use of a gage, after calibration, for variable measurements.

Uncertainty Contributors	Where Available
GRR or it's components EV, AV, and INT	GRR Module
Stability (of the gage)	Stability Module
Consistency (of the gage)	Stability Module

General Uncertainty Contributors (Type B)

These may apply to both uncertainty of calibration and uncertainty of measurement.

Uncertainty Contributors	Based On
Reference Standard	Certificate
Temperature Difference	Experience
Parallax Error	Experience

Details about each of these potential uncertainty contributors are given a few paragraphs below, in *Background on Uncertainty Contributors*.

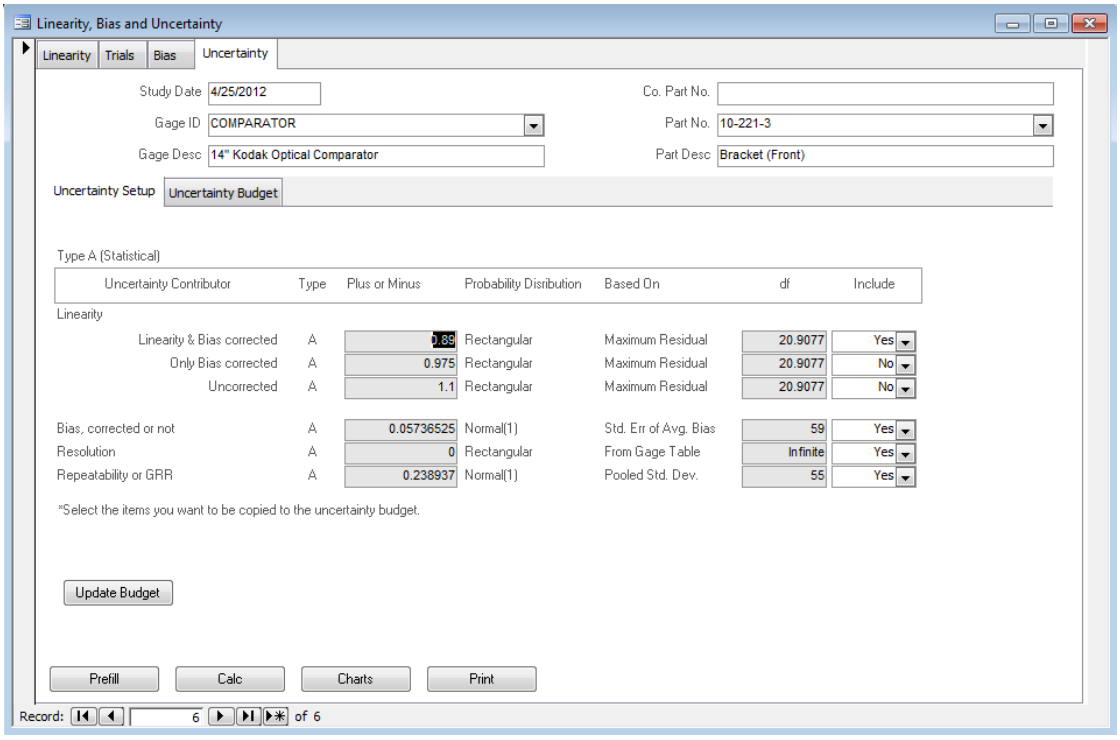
The Type A or Type B classification depends on whether you do a statistical study (A) or not (B). Thus, if you estimate stability error without doing a study it becomes Type B instead of Type A. Likewise, if you do a statistical study to determine the uncertainty of temperature difference it becomes Type A instead of Type B.

The task of determining uncertainty for a calibration or a laboratory measurement involves deciding which uncertainty contributors are to be included and listing them on a form called an Uncertainty Budget or error budget. This form combines all the contributors for you,

using RSS root-sum-square addition, and calculates *Expanded Uncertainty* for use on certificates or test reports.

Uncertainty Setup Sub-tab

The function of this sub-tab is to help you make decisions about which Uncertainty Contributors to include on the Uncertainty Budget.



The columns are explained in the table below.

Column	Description
Uncertainty Contributor	The type of measurement error variation to be considered as a contributor.
Type	Everything on this sub-tab is "Type A," meaning it was determined from observation and statistics.
Plus or Minus	The amount of plus or minus variation that was observed, expressed as a maximum deviation or a standard deviation.
Probability Distribution	The assumed pattern of variation for each type of error. See *Background on Probability Distributions*.
Based on	The information or calculation that was used to determine the Plus or Minus value.
DF	Degrees of Freedom. Think of DF as the "effective sample size" of the Plus or Minus value. This will be less than the actual sample size, depending on the method of calculation. The Uncertainty Budget will use DF to determine a "t Statistic."

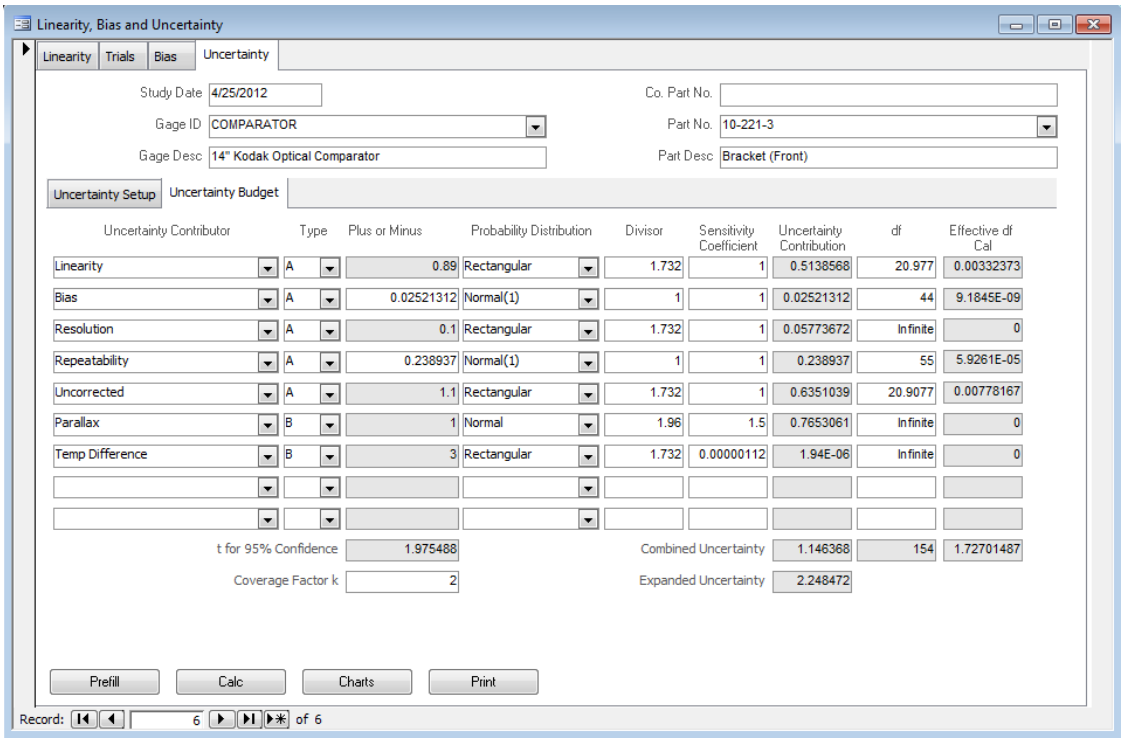
Column	Description
Include	Select *Yes* or *No* to determine whether an item is to be included in the Uncertainty Budget. This is the only column you can change.

The question of when to include an Uncertainty Contributor in the Uncertainty Budget is discussed in the table below.

Row	When to include
Linearity, with Linearity and Bias corrected	If Linearity was unacceptable use this estimate. (Even if you will not actually make a correction). This estimate has been corrected for systematic error. You may use this choice at all times, but the next two choices are also available.
Linearity, with Only Bias corrected	If Linearity was acceptable, and Bias was unacceptable you may substitute this estimate for the first choice. (Even if you will not actually make a correction). This estimate has been partially corrected for systematic error, and is more conservative than the first choice.
Linearity, Uncorrected	If Linearity and Bias were both acceptable you may substitute this estimate for the first choice. This estimate is not corrected for systematic error, and is more conservative than the first choice. **Note: If you believe Linearity error is negligible and not relevant, you may select No for all three Linearity choices.**
Bias, corrected or not	Include, unless it is not relevant.
Resolution	Include, unless it is not relevant.
Repeatability, or GRR	Include, unless it is not relevant. This would be GRR if there is more than one appraiser. For example if this study will apply to a family of gages you could use a different gage for each reference value. Another example would use one technician for half the trials, and another technician for the rest.

When your choices have been made, click on Update Budget. This will partially fill out the Uncertainty Budget.

Uncertainty Budget Sub-tab



Up to four rows will already have been filled in according to the choices you made in Uncertainty Setup. You may edit these choices here, and doing so will not change Uncertainty Setup. To enter additional Uncertainty Contributors, select from the drop-down list in an empty row. You may add to most of the drop-down lists. Just type an entry or modify an existing entry. The added item will appear the next time you open this module.

Column	Description
Uncertainty Contributor	Select the type of measurement error to be included, or type in a new one.
Type	Choose Type A if the Plus or Minus value will be based on statistical observations. Choose type B if this is based on certificates, or experience.
Plus or Minus	Enter the Plus or Minus variation caused by this contributor.
Probability Distribution	Select a Probability Distribution from the drop-down list or key in a new one. See Background on Probability Distributions below.
Divisor	GAGEtrak will fill this in if it recognizes the Probability Distribution. You may change it. See *Background on Probability Distributions*, below.
Sensitivity Coefficient	If the Plus or Minus value is in the proper units, and applies directly, then use the default value of one. If the units must be converted, or adjusted, insert the proper multiplier here. For example, the Plus or Minus value might be in temperature units, and you wish to use length and the

Column	Description
	coefficient of thermal expansion for this material to convert to millimeters.
Uncertainty Contribution	This is the "standard uncertainty," or standard uncertainty times the Sensitivity Coefficient. It will appear when you click on the Calc button. You cannot change it.
DF	For Type A items, insert the Degrees of Freedom here. If unknown, you may leave it blank (blanks will be treated as infinite). Degrees of Freedom for Type B items are Infinite by default.

Click on the Calc button and GAGEtrak automatically calculates these fields.

Field/Button Name	Description
t for 95% Confidence	This is a multiplier that could be used to convert Combined Uncertainty to a 95% confidence limit. It is based on the *DF* for Combined Uncertainty. It is here for comparison to *Coverage Factor k*.
Coverage Factor K	This multiplier is used to convert Combined Uncertainty to Expanded Uncertainty. Most, but not all, calibration certificates use a Coverage Factor of k = 2 for "approximately 95% confidence." You can change Coverage Factor k if you wish. Values of 1 or 3 are sometimes used, or a value equal to t for 95% Confidence. Coverage Factor k should be stated on calibration certificates.
Combined Uncertainty	This is the total of the Uncertainty Contributors, added by the RSS root-sum-square method, i.e. They are squared, summed, and the square root is taken.
DF for Combined Uncertainty	This is also called "effective degrees of freedom." It is used to calculate t for 95% Confidence. It is a good idea to include this DF on calibration certificates.
Expanded Uncertainty	This is the value to be included on applicable calibration certificates. Coverage Factor k should also be included. DF (of Combined Uncertainty) is good to include also.

Background on Probability Distributions

Normal Distribution

The bell-shaped probability distribution occurs so frequently that it is named "Normal." When a quantity is influenced by a large number of variables (as is usually true) the pattern of variation will tend to be Normal. The Plus or Minus variability of this distribution is expressed as some multiple of the standard deviation, such as 1σ, 2σ, or 3σ.When entering these Plus or Minus values choose Normal (1), Normal (2), or Normal (3), and GAGEtrak will select the appropriate Divisor to be used to convert to a standard uncertainty ($1\ \sigma$). When you run into something different, like $1.96\ \sigma$, just enter Normal for Probability Distribution, and 1.96 for Divisor. When you run into total variation like 6σ, or 5.15σ, you can enter Normal, and specify a divisor of, say, 5.15. You could also divide by two before entering the Plus or Minus value, and enter a Divisor of 2.576. Note that GAGEtrak

currently displays and prints GRR value as 1 σ, but other software, or old printouts of GAGEtrak GRR studies, may have been using 5.15 σ.

Rectangular Distribution

This is the distribution of choice when you have no idea what the real distribution is. This distribution occurs when something varies between limits, from one extreme to the other. An example would be air temperature as controlled by a thermostat. Enter the plus or minus value as one-half the difference between the extremes. GAGEtrak will select a Divisor of $\sqrt{3}$ = 1.732. Note: For temperature of solid objects see U-shaped Distribution below.

Triangular Distribution

This distribution occurs when two Rectangular distributions combine to form a third distribution. An example would be summing a pair of dice. Choose this distribution when you believe a distribution is "not quite Normal." Enter the Plus or Minus value as one-half the difference between the extremes. GAGEtrak will choose a Divisor of $\sqrt{6}$ = 2.449.

U-Shaped Distribution

Choose this when you believe that the extremes are more likely than values at the center. An example would be temperature of solid objects when controlled by a thermostat. The variation will resemble a sine wave when viewed on a time scale and will produce a U-shape when viewed as a distribution. Enter the Plus or Minus value as one-half the difference between the extremes. GAGEtrak will use a Divisor of $\sqrt{2}$ = 1.414.

Background on Uncertainty Contributors

The following are not complete lists.

Uncertainty of Calibration (Type A)

Uncertainty Contributor	Details
Linearity	Use the maximum residual as a Plus or Minus value. This means the maximum of (observed value minus the reference value minus any systematic error). The Probability Distribution is Rectangular.
Bias	Use the Standard Error of the Average Bias. The Probability Distribution is Normal (1).
Resolution	Use the smallest increment by which a measurement with this gage could increase or decrease. The Probability Distribution is Rectangular. If you prefer to use half of the resolution, enter a multiplier of 0.5 in the Sensitivity column.

Uncertainty Contributor	Details
Repeatability or GRR	For Linearity & Bias studies, use the pooled standard deviation. For Bias Only Studies, use the Standard Deviation of Bias. The Probability Distribution is Normal (1). GRR Studies are not ordinarily used for this, but they can be. The Probability Distribution is Normal (1) for an updated study, otherwise use Normal with a Divisor of 5.15. Linearity & Bias studies can be designed to use multiple gages from a gage family, in which case the result will be GRR rather than Repeatability. Both Linearity & Bias and Bias Only can be designed to use more than one appraiser. For example by having two appraisers do six trials each.
Hysteresis	Use the maximum difference between upscale and downscale readings on the same artifacts. This test should cover the full range of the gage. For example, gently add weights to a scale, one at a time, until you get to the full range, then gently remove the weights one at a time. Record readings at each step. The weights don't have to be known values. The Probability Distribution is Rectangular.
Stability (of the reference standard)	Include this item if the reference standard is a variable gage, and if a Stability study shows instability of the X bar chart. See the next table for instructions. The Probability Distribution is Rectangular.
Consistency (of the reference standard)	Include this item if the reference standard is a variable gage, and if a Stability study shows instability of the s chart. See the next table for instructions. The Probability Distribution is Normal (1).

Uncertainty of Measurement (Type A)

These apply to working measurements made after calibration.

Uncertainty Contributor	Details
GRR, or its components EV, AV, and INT	These are available in GRR studies. In this version of GAGEtrak the Probability Distribution is Normal (1). Other sources, or old printouts, may require a Divisor of 5.15.
Stability (of the gage)	Include this item when a Stability study shows instability. Use the maximum shift or drift that occurs on an X bar chart. This can be done by ignoring where the centerline of the limits is currently drawn on the chart, and imagining the limits were centered around the variation at the beginning of the chart. Then imagining that the limits were centered around the variation at the point of maximum shift or drift. Use the difference between the two imaginary centerlines as the Plus or Minus value. The Probability Distribution is Rectangular.
Consistency (of the gage)	Follow the instructions for Stability, but do it with the s chart, when the s chart is unstable. The Probability Distribution is Normal (1).

General Uncertainty Contributors (Type B)

These apply both to uncertainty of calibration and uncertainty of measurement.

Uncertainty Contributor	Details
Reference Standard	Use the Expanded Uncertainty from the reference standards' incoming calibration certificate. Expanded Uncertainties are usually Type B, and the Probability Distribution is usually Normal (2). Look for the Coverage Factor k, and DF. Use k as the Divisor. If DF is furnished, enter it and consider choosing Type A.
Temperature Difference	There are multiple kinds of uncertainty that result from materials and gages not being exactly at 20°C (68°F). Estimate the Plus or Minus values based on experience, and calculate a Sensitivity Coefficient using the length and coefficient of thermal expansion. The Probability Distribution is usually U-shaped. (Although it was long thought to be Rectangular.)
Parallax	This variable occurs when a pointer or indicator mark is not in the same plane as the dial face or scale, and the dial face or scale is not perpendicular to the appraisers' line of site. (Recall trying to read a speedometer from the passenger seat). The Probability Distribution is usually Rectangular.

More Information on Uncertainty

For detailed and authoritative information about uncertainty we recommend consulting *NIST Technical Note TN1297*. It meets all applicable ISO and ANSI Standards and is more specific than the standards. Lots of examples are good too, and for that we recommend *European Accreditation publication EA-4/02*. Information on how to calculate Plus or Minus values for specific Uncertainty Contributors comes from the *NIST/ SEMATECH e-Handbook of Statistical Methods*. See Other Techniques/References at the end of the MSA chapter for details on how to download or view these free publications.

Linearity Formulas

x = reference value

y = observation - x

b = intercept

a = slope

m = subgroup size

g = number of subgroups

$\hat{y}$ = predicted bias

R^2 = goodness of fit

SE = standard error of linearity

df = degrees of freedom

$$a = \frac{\Sigma xy - \left(\Sigma x \frac{\Sigma y}{gm}\right)}{\Sigma x^2 - \frac{(\Sigma x)^2}{gm}}$$

$$b = \Sigma \frac{y}{gm} - a \times \left(\Sigma \frac{x}{gm}\right)$$

$$SE = \sqrt{\frac{\Sigma y^2 - b\sum y - a\sum xy}{gm - 2}}$$

df = *gm*-2

$$t\,Stat_a = \frac{|a|}{\frac{SE}{\sqrt{\sum_1^{gm} (x - \bar{x})^2}}}$$

$$t\,Stat_b = \frac{|b|}{SE \times \left(\frac{1}{gm} + \frac{\bar{x}^2}{\sum_1^{gm} (x - \bar{x})^2}\right)}$$

$$\hat{y} = b + a \times x$$

confidence bands for x_0:

$$= b + a \times x_0 \pm \left(t_{gm-2,0.025} \times SE \times \sqrt{\frac{1}{gm} + \frac{(x_0 - \bar{x})^2}{\sum_1^{gm} (x - \bar{x})^2}}\right)$$

$$R^2 = \frac{\left[\Sigma xy - \Sigma x \frac{\Sigma y}{gm}\right]^2}{\left[\Sigma x^2 - \left(\frac{(\Sigma x)^2}{gm}\right)\right] \times \left[\Sigma y^2 - \left(\frac{(\Sigma y)^2}{gm}\right)\right]}$$

Bias Formulas

y = observation - x

SE_B = standard error of bias

$\hat{\sigma}$ = repeatability

$$\text{Avg. Bias} = \bar{\bar{y}}$$

$$\hat{\sigma} = \sqrt{\frac{\sum (y - \bar{\bar{y}})^2}{gm - 1}}$$

df = *gm*-1

$$SE_B = \hat{\sigma} / \sqrt{gm}$$

Confidence Bounds

$$= Bias \pm SE_B \times t_{df,0.025}$$

when range method is specified for bias:

$$\hat{\sigma} = \bar{R} / d_2^*$$

df = from d_2^* table

Confidence Bounds

$$= Bias \pm \frac{d_2}{d_2^*} \times SE_B \times t_{df,0.025}$$

m d_2^* Table (g.1 row is *df*, g.2 row is d_2^*)

g	2	3	4	5	6	7	8	9	10	11	12
1.1	1	2	2.9	3.8	4.7	5.5	6.3	7	7.7	8.3	9
1.2	1.41421	1.91155	2.23887	2.48124	2.67253	2.82981	2.96288	3.07794	3.17991	3.26909	3.35016
2.1	1.9	3.8	5.7	7.5	9.2	10.8	12.3	13.8	15.1	16.5	17.8
2.2	1.27931	1.80538	2.15069	2.40484	2.65438	2.76779	2.90562	3.02446	3.12869	3.22134	3.30463
3.1	2.8	5.7	8.4	11.1	13.6	16.0	18.3	20.5	22.6	24.6	26.5
3.2	1.23105	1.76858	2.12049	2.37883	2.58127	2.74681	2.88628	3.00643	3.11173	3.20526	3.28931
4.1	3.7	7.5	11.2	14.7	18.1	21.3	24.4	27.3	30.1	32.7	35.3
4.2	1.20621	1.74989	2.10522	2.36571	2.56964	2.73626	2.87656	2.99737	3.10321	3.19720	3.28163
5.1	4.6	9.3	13.9	18.4	22.6	26.6	30.4	34.0	37.5	40.8	44.0
5.2	1.19105	1.73857	2.09651	2.35781	2.56263	2.72991	2.87071	2.99192	3.09808	3.19235	3.27701
d_2	1.12838	1.69257	2.05875	2.32593	2.53441	2.70436	2.84720	2.97003	3.07751	3.17287	3.25846

g	13	14	15	16	17	18	19	20

1.1	9.6	10.2	10.8	11.3	11.9	12.4	12.9	13.4
1.2	3.42378	3.49116	3.55333	3.61071	3.66422	3.71424	3.76118	3.80537
d2	3.33598	3.40676	3.47193	3.53198	3.58788	3.64006	3.68896	3.73500

Uncertainty Formulas

p = plus or minus value

d = divisor

c =sensitivity coefficient

u_i = individual uncertainty contribution

df_i = individual degrees of freedom

u_c = combined uncertainty

df_c = combined (effective) degrees of freedom

k = coverage factor

U = expanded uncertainty

$$u_i = {}^{p}\!/_{d} \times c$$

$$u_c = \sqrt{\sum u_i^2}$$

$$df_c = {u_c^4}\Big/{\sum \frac{u_i^4}{df_i}}$$

$$U = u_c \times k$$

df for uncertainty of linearity are not specified in the usual literature. GAGEtrak uses the *df* from d_2^* row 1.1 as a reasonable estimate. The following Weibull approximation of *df* from d_2^* row 1.1 is used for gm > 20:

$$df = (gm-1) \times e^{-\left(\frac{gm-3}{54.69}\right)^{0.888}}$$

Stability (and Bias)

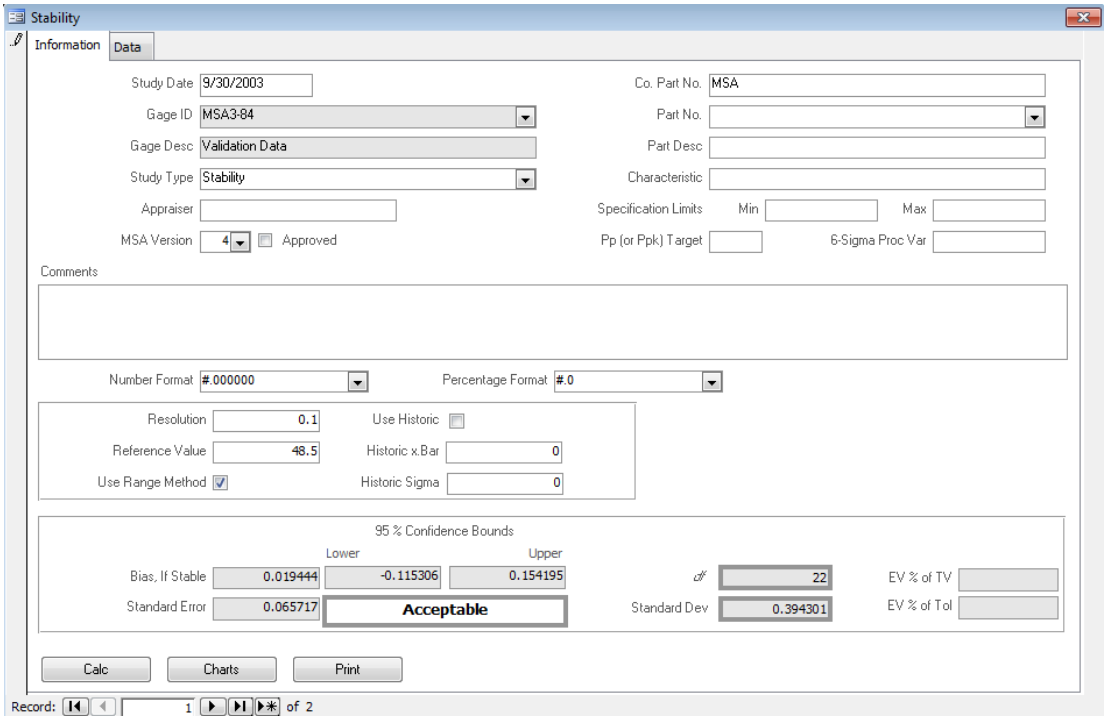
When we choose a calibration frequency of, say, every 6 months it is in the assumption, or hope, that the gage calibration will remain stable for that length of time. A Stability Study verifies this assumption to see if it is true. Plotting a control chart of calibration, for a particular reference standard, does this. For example, we could check a 1 inch gage block 3

times and do this once a week for 25 weeks, or once every two weeks for 50 weeks. (Automotive requirements call for a minimum of 25 data points to establish stability).

During the study, adjustments are not usually made unless there is an instability signal. Instability signals include 1 point out of limits, 2 points out of 3 beyond 2/3 of a limit, or 7 points in a row on the same side of the central line (some industries use 8 or 9 points in a row). See one of the references on statistical process control (SPC) for more information. The X bar, or X, chart detects changes in bias. If these charts are stable it means the bias did not change and GAGEtrak can calculate the bias (as long as you are able to enter a reference value for the reference standard or retained sample that was used). If the chart shows a shift or drift in bias, the amount of change (estimated visually) is the Stability contribution to uncertainty. Note: if bias was not stable, the estimate of bias in this study should not be used.

The R, s, and MR charts detect changes in repeatability of calibration. If the chart shows a shift or drift in repeatability, the amount of change (estimated visually) is the Consistency contribution to uncertainty.

Information Tab



Each of the fields in the Information tab screen is explained in the table below.

Field/Button Name	Description
Study Date	Enter the date of the study; this field defaults to the current date.
Gage ID	Select the gage ID of the measurement device.
Gage Desc.	In this field, you'll see the name of the gage or measurement device.
Study Type	GAGEtrak automatically sets this field to "Stability".
Appraiser	Enter the name of the person conducting the study.
MSA Version	Refers to the Measurement Systems Analysis Reference Manual published by AIAG. Use Version 4 for new studies. Existing Version 3 studies may be updated for new features by changing to Version 4. Updates are reversible.
Approved	Select if study is approved.
Comments	Use this field to enter any comments.
Co. Part No.	Enter your internal company reference standard, part or job number, if relevant.
Part No.	Select a related reference standard or part number, such as the customer or supplier part number, if relevant.
Part Desc.	This field displays the description or name of the reference standard or part.
Characteristic	In this field, you'll see the characteristic that you're evaluating.
Specification Limits	Be sure to enter the minimum and maximum Specification Limit values; otherwise, the software can't calculate the % tolerance values for your study.
Pp (or Ppk) Target	A process capability or performance target may be entered (typically 1.33 or 1.67). GAGEtrak will use it to reduce Tolerance to be an estimate of Process Variation.
6-Sigma Proc. Var.	If you know the 6-Sigma Process Variation of the characteristic that you're measuring, enter it here. It will be divided by 6 and used for Total Variation TV.
Number Format	Select the format you want for calculations.
Percentage Format	Select the format you want for calculations.
Resolution	Enter the resolution of the gage. This controls the minimum resolution of the Histogram chart.
Reference Value	The value of the reference standard used in the study. (Used to calculate Bias).
Use Range Method	If selected, bias statistics will be calculated from an R chart, otherwise the RMS standard deviation will be used.
Use Historic?	If selected, control limits will be calculated from historic values of X bar and sigma.
Historic X Bar	If available, enter a known value for the grand average. (This might be known from a Linearity or Bias study, or from a previous Stability study).
Historic Sigma	If available, enter a known value for the standard deviation. (This might be known from a Linearity or Bias study, or from a previous Stability study).

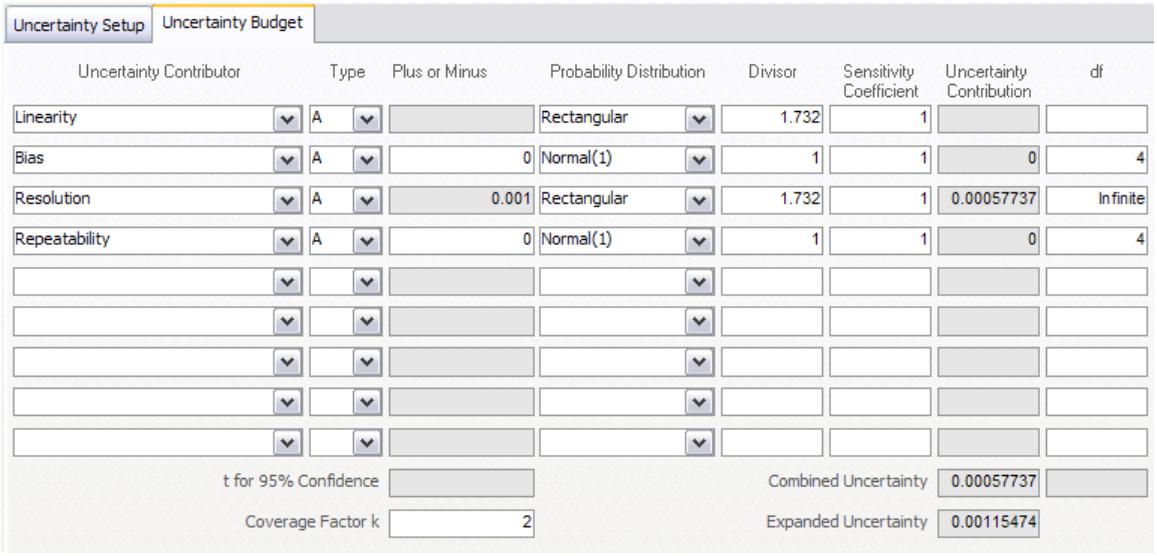
To see the following fields, enter data on the Data tab and click on the Calculate button. These estimates should not be used unless the control charts have been confirmed to be

stable. If the charts, discussed below, do not appear stable, the following estimates will be incorrect.

Field/Button Name	Description
Bias, if stable	The bias of the gage.
Standard Error	The variability of the bias estimate.
Lower	The lower 95% confidence limit of Bias. This will be unacceptable if greater than zero.
Upper	The upper 95% confidence Limit for Bias. This will be unacceptable if less than zero.
df	Degrees of freedom for the Standard Deviation and Standard Error.
Standard Dev	Standard Deviation. The repeatability of individual measurements.

Creating an Uncertainty Budget for Bias by Control Chart Method

Go to The Linearity, Bias and Uncertainty Module and set up the information tab. Choose study type Bias Only and enter 0 as a single reference value (or you can do a linearity study with real data if you prefer). Indicate in comments that Bias values will come from the Stability Module and specify study date. Enter a column of 5 zeros in trials. Then setup an Uncertainty Budget like this:



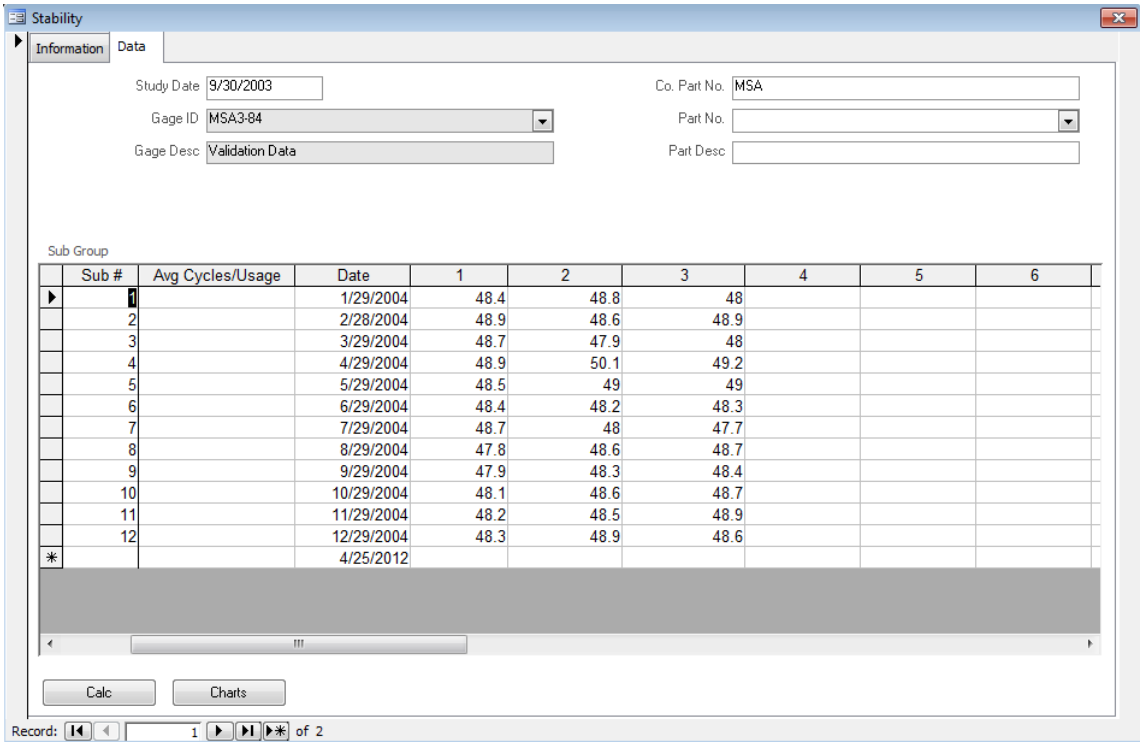
To complete the Uncertainty Budget enter the following from the Stability Module.

1. For Bias, enter Standard Error as the Plus or Minus value and df.
2. Enter Resolution; if you want to use half, enter 0.5 as a Sensitivity Coefficient.
3. For Repeatability, enter Standard Dev as the Plus or Minus value and df.
4. Enter any additional items you wish and press Calc.

Data Tab

To add stability sub group measurements, click on the first row in the Sub Group table. Each sub group row represents the values of the repeated master (or master part) measurements that you make. You must use the same number of readings for each sub group of measurements; for example, you shouldn't use a sample size of five repeated readings on your first sub group and then use only three repeated readings on your second sub group. Add additional sub groups to the rows following the first sub group row.

> **Note: Subgroup sizes of 3 to 5 are common for stability studies. GAGEtrak can accommodate subgroup sizes of 1 to 10.**



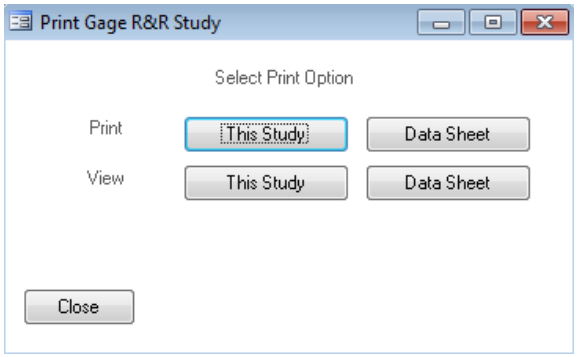
The subgroup record fields are explained below (use the table's horizontal scroll bar to view the fields on the rightmost side of the table).

Field Name	Description
Sub #	Use this number to identify the subgroup—usually you will start with 1, then go to 2, then 3, and keep using consecutive numbering. However, you can also use letters, such as "M-01", "M-02", then "M-03".

Field Name	Description
Date	In this field, enter the date on which you measured the repeated readings.
1 through 10	Enter the actual measurements taken on the master (or master part). For example, if you're taking a sample size of three repeated readings, enter the first reading in field 1, the second in field 2, the third in field 3. In this example, the subgroup size is five, so fields 6 through 10 remain blank.
R	In this field, you'll see the range for the sub group (the largest reading minus the smallest reading). This value is calculated; you cannot change it.
S	GAGEtrak calculates the standard deviation for the sub group (only when the sub group size is two or more). You can't change this value.
Xbar ($\bar{X}$)	In this field, you'll see the average (arithmetic mean) for the sub group. This value is calculated; you can't change it.
MR	In this field you'll see the Moving Range between this subgroup average and the previous subgroup average. This will be blank for the first subgroup.
Notes	Record any comments in this field.

Printing the Stability Study

To print the study, click the Print button, and a Print menu will appear, as shown here:



To print the study report, click the This Study button that's in the Print section. To preview the study report on-screen, click the This Study button that's in the View section. Use the Data Sheet buttons to print or preview a blank data collection sheet you can use to record measurements during the study.

Viewing Stability Control Charts

To view a Stability Control chart, click the Chart button, and then choose which chart you want. Each choice shows a pair Control Charts, except for the Histogram. The top chart detects changes in bias, and the bottom chart detects changes in repeatability. For interpretation, the program draws control limits and average lines on each chart.

Printing or Sending Charts

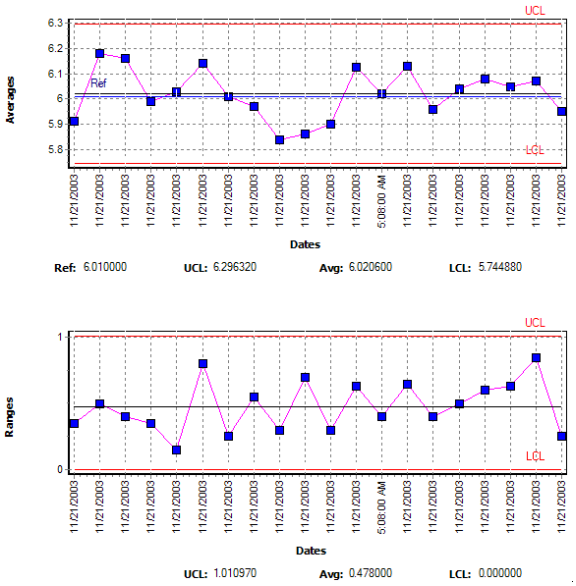
Each chart has a button for Print, and a button for Send (as an email attachment).

We'll discuss each type of chart next.

X bar & R charts (Average and Range Charts)

These charts will be familiar to many users because they are used extensively in manufacturing. They work best for small subgroup sizes, and are not recommended for subgroup sizes of 9 or 10. They do not work for a subgroup size of 1.

Example Stability Control Chart



X bar & s Charts (Average and Standard Deviation Charts)

These charts work well for subgroup sizes of 2 and up. They do not work for a subgroup size of 1.

X & MR Charts (Individual and Moving Range Charts)

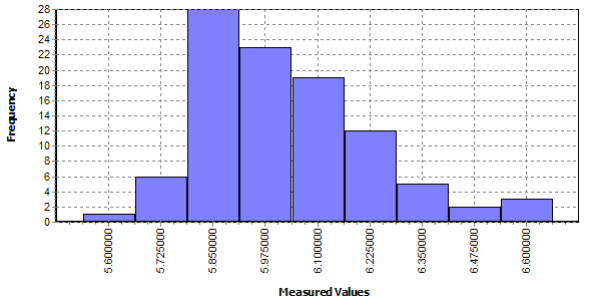
These charts work for a subgroup size of 1 and up. Control Limits are based on variation between subgroups rather than variation within subgroups. The ability to use a subgroup size of one allows use for destructive or non-replicable measurements. See *Chapter 4* of *Measurement Systems Analysis, Third Edition* (MSA3) for more information and other applications. For subgroups sizes larger than 1, the other charts are usually preferred but if their limits seem too tight or too loose then use X & MR.

Note: Despite the name "Individual Chart," when the subgroup size is greater than 1, averages are plotted).

Histogram

This chart is used to show the central tendency, spread, and shape of the distribution.

Example Histogram



Calculated Control Chart Fields

These are calculated from the data, unless you specified to use historic values for X bar and Sigma.

Field Name	Description
UCL	Upper Control Limit for mean or range, etc.
AVG	Average mean, or average range, etc.
LCL	Lower Control Limit for mean or range, etc.

Control Chart Formulas

m = subgroup size (number of observations in sub group)

g = number of subgroups

X = individual sample measurement

X_0 = reference value

R = Range

$\bar{x}$ = subgroup average

s = subgroup standard deviation

$\hat{\sigma}$ = repeatability standard deviation

SE = standard error of bias

A_2,A_3, B_3, B_4, C_4, d_2, D_3, D_4 = control chart constants based on value of *m*, as shown in the table below:

m	A_2	A_3	D_3	D_4	c_4	B_3	B_4
2	1.87997	2.658679	0	3.267	0.797885	0	3.267
3	1.02333	1.954410	0	2.574	0.886227	0	2.568
4	0.72865	1.628102	0	2.282	0.921318	0	2.266
5	0.57682	1.427299	0	2.115	0.939986	0	2.089
6	0.48325	1.287128	0	2.004	0.951533	0.030	1.970
7	0.41928	1.181916	0.076	1.924	0.959369	0.118	1.882
8	0.37253	1.099096	0.136	1.864	0.965030	0.185	1.815
9	0.33670	1.031661	0.184	1.816	0.969311	0.239	1.761
10	0.30826	0.975350	0.223	1.777	0.972659	0.284	1.716

$\bar{\bar{X}}$ & R Charts	$\bar{\bar{X}}$ & s Charts	X & MR Charts
$\bar{\bar{X}} = \Sigma X / m$	$\bar{\bar{X}} = \Sigma X / m$	$\bar{\bar{X}} = \Sigma X / m$
$R = \text{Max } X - \text{Min } X$	$s = \sqrt{\frac{\sum (X - \bar{X})^2}{m-1}}$	$MR = \lvert \text{This } \bar{X} - \text{Previous } \bar{X} \rvert$
$\bar{R} = \Sigma R / g$	$\bar{s} = \Sigma s / g$	$\overline{MR} = \Sigma MR / (g-1)$
$UCL_R = \bar{R} \times D_4$	$UCL_s = \bar{s} \times B_4$	$UCL_{MR} = \overline{MR} \times 3.267$
$LCL_R = \bar{R} \times D_3$	$LCL_s = \bar{s} \times B_3$	$LCL_{MR} = \overline{MR} \times 0$
$\bar{\bar{X}} = \Sigma \bar{X} / g$	$\bar{\bar{X}} = \Sigma \bar{X} / g$	$\bar{\bar{X}} = \Sigma \bar{X} / g$
$UCL_{\bar{X}} = \bar{\bar{X}} + (A_2 \times \bar{R})$	$UCL_{\bar{X}} = \bar{\bar{X}} + (A_3 \times \bar{s})$	$UCL_{\bar{X}} = \bar{\bar{X}} + (2.65868 \times \overline{MR})$
$LCL_{\bar{X}} = \bar{\bar{X}} - (A_2 \times \bar{R})$	$LCL_{\bar{X}} = \bar{\bar{X}} - (A_3 \times \bar{s})$	$LCL_{\bar{X}} = \bar{\bar{X}} - (2.65868 \times \overline{MR})$
$\text{Bias} = \bar{\bar{X}} - X_0$	$\text{Bias} = \bar{\bar{X}} - X_0$	$\text{Bias} = \bar{\bar{X}} - X_0$
for $m \uparrow 1$:	$\hat{\sigma} = \sqrt{\frac{\sum (X - \bar{\bar{X}})^2}{(g \times m) - 1}}$	for $m = 1$ (note subgroup size for MR is 2, for any m):
$\hat{\sigma} = \bar{R} / d_2^*$	$df = (g \times m) - 1$	$\hat{\sigma} = \overline{MR} / d_2^*$
df = from d_2^* table		df = from d_2^* table
$SE = \hat{\sigma} / \sqrt{g \times m}$		
Confidence Bounds		

$= Bias \pm \frac{d_2}{d_2^*} \times SE \times t_{df,0.025}$

$SE = \hat{\sigma} / \sqrt{g \times m}$

Confidence Bounds

$= Bias \pm SE \times t_{df,0.025}$

$SE = \hat{\sigma} / \sqrt{g}$

Confidence Bounds

$= Bias \pm \frac{d_2}{d_2^*} \times SE \times t_{df,0.025}$

m d_2^* Table (g.1 row is *df*, g.2 row is d_2^*)

g	2	3	4	5	6	7	8	9	10
1.1	1.0	2.0	2.9	3.8	4.7	5.5	6.3	7.0	7.7
1.2	1.41421	1.91155	2.23887	2.48124	2.67253	2.82981	2.96288	3.07794	3.179905
2.1	1.9	3.8	5.7	7.5	9.2	10.8	12.3	13.8	15.1
2.2	1.27931	1.80538	2.15069	2.40484	2.65438	2.76779	2.90562	3.02446	3.12869
3.1	2.8	5.7	8.4	11.1	13.6	16.0	18.3	20.5	22.6
3.2	1.23105	1.76858	2.12049	2.37883	2.58127	2.74681	2.88628	3.00643	3.11173
4.1	3.7	7.5	11.2	14.7	18.1	21.3	24.4	27.3	30.1
4.2	1.20621	1.74989	2.10522	2.36571	2.56964	2.73626	2.87656	2.99737	3.10321
5.1	4.6	9.3	13.9	18.4	22.6	26.6	30.4	34.0	37.5
5.2	1.19105	1.73857	2.09651	2.35781	2.56263	2.72991	2.87071	2.99192	3.09808
6.1	5.5	11.1	16.7	22.0	27.0	31.8	36.4	40.8	45.0
6.2	1.18083	1.73099	2.08985	2.35253	2.55795	2.72567	2.86680	2.98829	3.09467
7.1	6.4	12.9	19.4	25.6	31.5	37.1	42.5	47.6	52.4
7.2	1.17348	1.72555	2.08543	2.34875	2.55465	2.72263	2.86401	2.98568	3.09222
8.1	7.2	14.8	22.1	29.2	36.0	42.4	48.5	54.3	59.9
8.2	1.16794	1.72147	2.08212	2.34591	2.55208	2.72036	2.86192	2.98373	3.09039
9.1	8.1	16.6	24.9	32.9	40.4	47.7	54.5	61.1	67.3
9.2	1.16361	1.71828	2.07953	2.34370	2.55013	2.71858	2.86528	2.98221	3.08896
10.1	9.0	18.4	27.6	36.5	44.9	52.9	65.6	67.8	74.8
10.2	1.16514	1.71573	2.07746	2.34192	2.54856	2.71717	2.85898	2.98100	3.08781
11.1	9.9	20.2	30.4	40.1	49.4	58.2	66.6	74.6	82.2
11.2	1.15729	1.71363	2.07577	2.34048	2.54728	2.71650	2.85791	2.98000	3.08688
12.1	10.7	22.0	33.1	43.7	53.8	63.5	72.6	81.3	89.7
12.2	1.15490	1.71189	2.07436	2.33927	2.54621	2.71504	2.85702	2.97917	3.08610

g	2	3	4	5	6	7	8	9	10
13.1	11.6	23.8	35.8	47.3	58.3	68.7	78.6	88.1	97.1
13.2	1.15289	1.71041	2.07316	2.33824	2.54530	2.71422	2.85627	2.97847	3.08544
14.1	12.5	25.7	38.6	51.0	62.8	74.0	84.7	94.9	104.6
14.2	1.15115	1.70914	2.07213	2.33737	2.54452	2.71351	2.85562	2.97787	3.08487
15.1	13.4	27.5	41.3	54.6	67.2	79.3	90.7	101.6	112.1
15.2	1.14965	1.70804	2.07125	2.33661	2.54385	2.71290	2.85506	2.97735	3.08438
16.1	14.3	29.3	44.1	58.2	71.7	84.5	96.7	108.4	119.5
16.2	1.14833	1.70708	2.07047	2.33594	2.54326	2.71237	2.85457	2.97689	3.08395
17.1	15.1	31.1	46.8	61.8	76.2	89.8	102.8	115.1	127.0
17.2	1.14717	1.70623	2.06978	2.33535	2.54274	2.71190	2.85413	2.97649	3.08358
18.1	16.0	32.9	49.5	65.5	80.6	95.1	108.8	121.9	134.4
18.2	1.14613	1.70547	2.06917	2.33483	2.54228	2.71148	2.85375	2.97613	3.08324
19.1	16.9	34.7	52.3	69.1	85.1	100.3	114.8	128.7	141.9
19.2	1.14520	1.70480	2.06862	2.33436	2.54187	2.71111	2.85341	2.97581	3.08294
20.1	17.8	36.5	55.0	72.7	89.6	105.6	120.9	135.4	149.3
20.2	1.14437	1.70419	2.06813	2.33394	2.54149	2.71077	2.85310	2.97552	3.08267
d_2	1.12838	1.69257	2.05875	2.32593	2.53441	2.70436	2.84720	2.97003	3.07751
cd	0.8765	1.8150	2.7378	3.6230	4.4658	5.2673	6.0305	6.7582	7.4539

For g > 20 use d_2, and estimate *df* with the constant difference *cd*.

Attribute Risk Analysis

Attribute gages produce binary outputs like pass or fail, and zero or one. To perform this study you need to select fifty parts with a range of measurement values that extends all the way from out of specification at the lower specification limit to out of specification at the upper specification limit. You will need three appraisers who check each part in random order, then check them all again in a different random order, for a total of 3 trials per appraiser.

This procedure is similar to a study in previous versions of GAGEtrak called the Short Attribute study. The Short Attribute study involved only twenty parts, and published

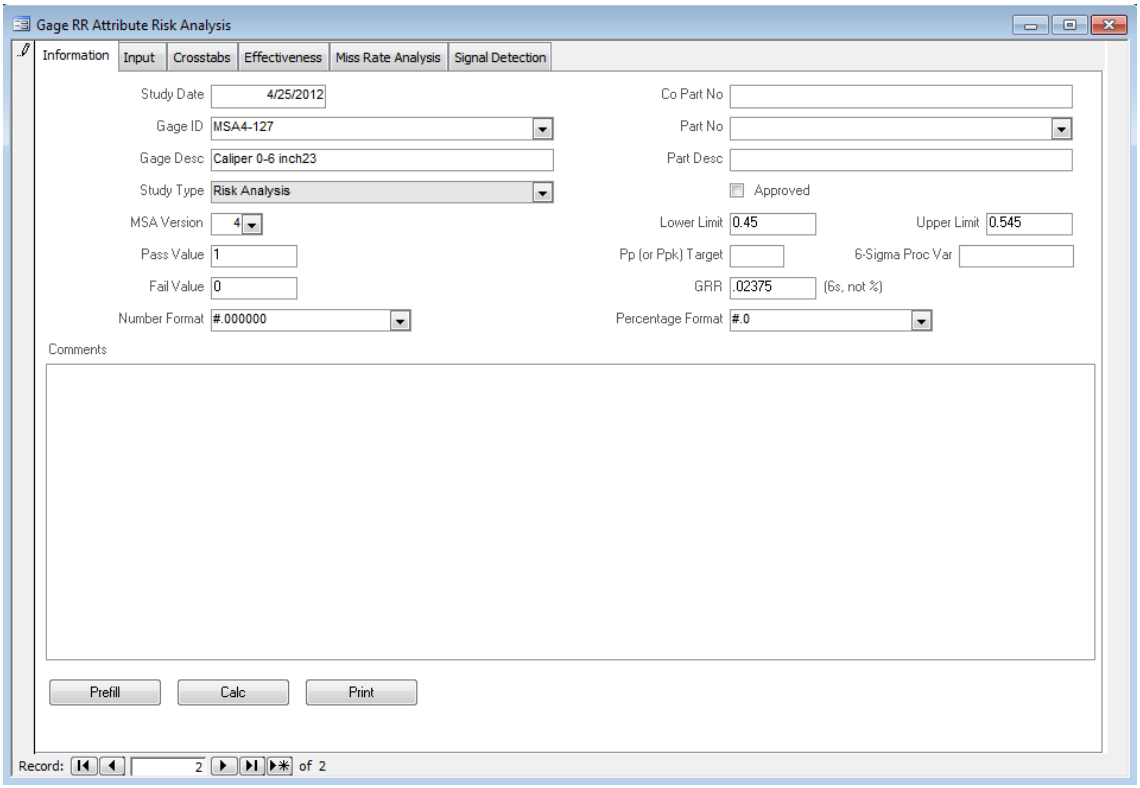
requirements called for perfect agreement. New requirements allow a modest amount of disagreement within or between appraisers.

Gage theory tells us that a part made exactly on a specification limit would have a fifty-fifty chance of being accepted by a perfect gage that has no bias. This is true for both attribute and variable gages. (For customer protection, attribute gage manufacturers deviate from theory and shoot for slightly less than 50% acceptance at the specification limit).

Because all gages, attribute and variable, have repeatability and reproducibility problems, parts made too near a specification limit will experience inevitable disagreements between and within appraisers.

This module will compare pairs of appraisers and perform hypothesis tests to determine if there is sufficient agreement. If a variable gage is available that can check the same parts, GAGEtrak will compare attribute and variable decisions and calculate gage repeatability and reproducibility (GRR) for the attribute gage. If variable measurements are not feasible you can substitute attribute reference values from an authoritative attribute source (the customer, perhaps).

Information Tab

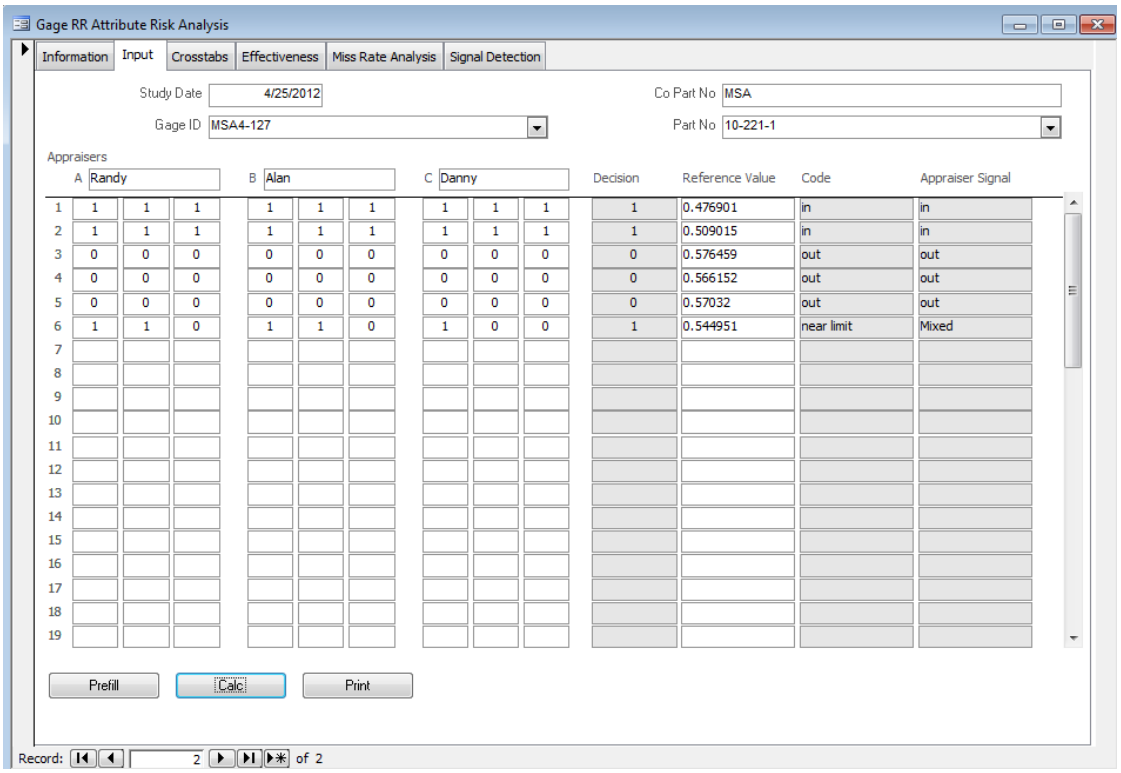


The Information tab contains these fields and buttons:

Field/Button Name	Description
Study Date	This field defaults to the current date, but you can change it.
Gage ID	Select the ID code for the gage you're using in the study.
Gage Desc	Once you select a gage ID, the gage's description will appear in this field.
Study Type	Risk analysis is already internal here. You can't change it.
MSA Version	Refers to the Measurement Systems Analysis Reference Manual. Use Version 4 for new studies. Existing Version 3 studies may be updated for new features by changing to Version 4. Updates are reversible.
Pass Value	Enter the code to be used for Pass (like 1, or P) letters and numbers are accepted
Fail Value	Enter the code to be used for Fail (like 0, or F) letters and numbers are accepted
Number Format	Select the format you want for calculations.
Comments	Enter any comments, such as the gage I.D. of a variable gage to be used for cross checking.
Co. Part No.	Enter your internal company part or job number.
Part No.	Select, or enter the number of the part used in the study.
Part Desc.	After you select the part number, its part description appears in this field.
Approved	Select if study is approved.

Field/Button Name	Description
Upper Limit	The upper specification limit for the part. If attribute data will be used for reference values, enter a numerical code for Pass Value (e.g., 1), see above, and enter a slightly larger value for Upper Limit (e.g., 1.5).
Lower Limit	The lower specification limit for the part. If attribute data will be used for reference values, enter a numerical code for Pass Value (e.g., 1), see above, and enter a slightly smaller value for Lower Limit (e.g., 0.5).
Pp (or Ppk) Target	If variable data will be used for reference values, a process capability or performance target may be entered (typically 1.33 or 1.67). GAGEtrak will use it to reduce Tolerance to be an estimate of Process Variation.
6-Sigma Proc. Var.	If variable data will be used for reference values, and you know the 6-Sigma Process Variation of the characteristic that you're measuring, enter it here. It will be divided by 6 and used for Total Variation TV.
GRR	If the variable gage has a known GRR for this part characteristic, enter it here. Note: The program needs standard deviation multiplied by 6. Do not use percent.
Percentage Format	Select the format you want for calculations.

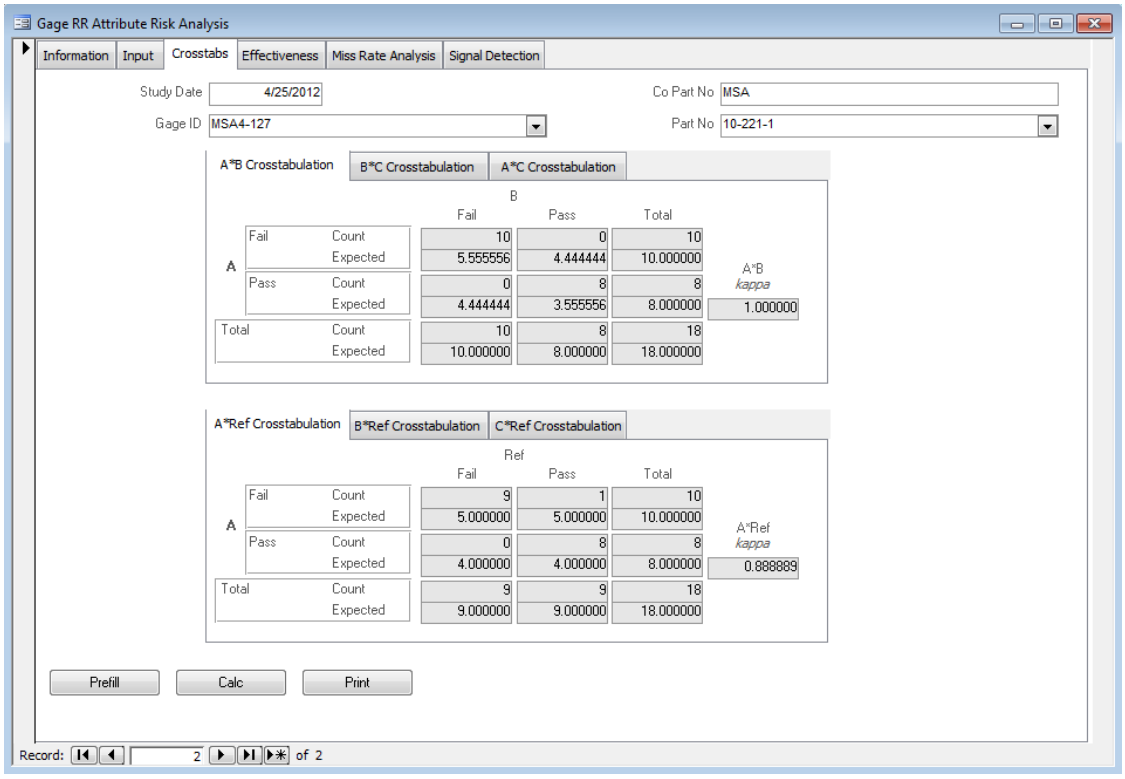
Input Tab



The Input tab contains these fields and buttons:

Field/Button Name	Description
Appraiser A, B and C	In these fields, enter the name of each appraiser.
Appraiser 1-50	Enter the appraiser's measurement results in these fields.
Decision 1-50	The Pass or Fail Decision made by the Reference Value will appear after you click the Calc button.
Reference Value 1-50	Enter measurements from a variable gage or rating system. If variable measurements are not feasible you may substitute numerical codes (like 0 and 1) from attribute decisions by an authority (the customer, for example).
Code 1-50	If GRR was entered for the variable gage, parts too close to the limit for consistent decisions are coded "near limit," after you click on the Calc button.
Appraiser Signal	Parts that appraisers made mixed decisions about are coded "mixed" after you click on the Calc button.
Prefill	You can use the Prefill feature to fill all measurements with the code for Pass (or Fail) if convenient.
Calc	After you enter all of the measurements, click this button to see the results of your study.
Print	If you want to print the study, click this button.

Crosstabs Tab



Appraiser vs. Appraiser

In the upper set of subtabs, the tables compare appraisers to each other two at a time, using a method called Crosstabulation.

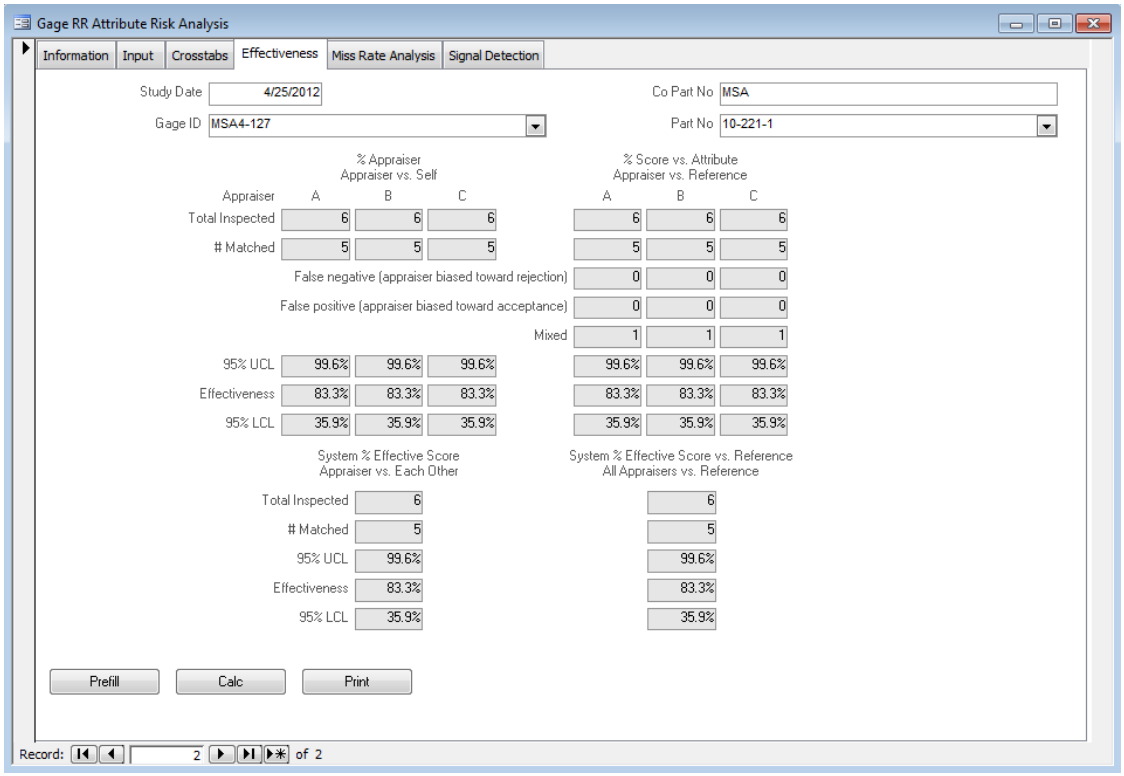
Appraiser vs. Ref. Value

In the lower set of subtabs, the tables compare each appraiser to the variable gage.

The Crosstabs Tab has these fields and buttons:

Field/Button	Description
A*( ) Crosstabulation	Select which pair of Appraisers you want to evaluate.
Count	The number of times the two selected Appraisers voted a particular way. For example, suppose there were 6 times A said Fail and B said Pass.
Expected	The number of times we would expect a particular vote combination to occur based on the totals.
Totals	The totals for each column and row.
Kappa	The Kappa statistic measures agreement, on a scale of zero to one. Over 0.75 is considered good, under 0.40 is considered poor.

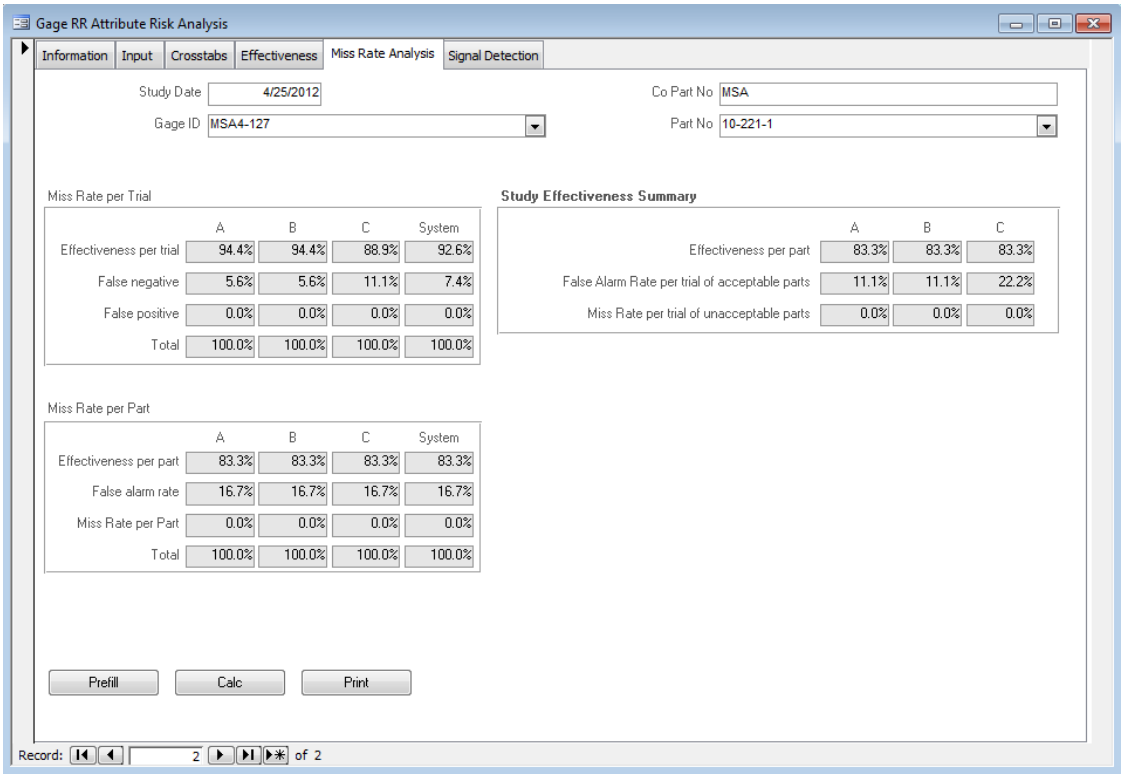
Effectiveness Tab



The following fields and buttons are available; and apply to each column in which they appear. There are comparisons of each appraiser to themselves, each other, and the reference values from the variable gage.

Field/Button	Description
Total Inspected	Number of parts inspected.
# Matched	Number of parts with consistent ratings.
False Negative	Number of parts that were consistently rejected by the appraiser and accepted by the variable gage.
False Positive	Number of parts that were consistently accepted by the appraiser and rejected by the variable gage.
Mixed	Number of parts where an appraiser had inconsistent results.
95% UCL	A 95% Upper Confidence Limit for the Effectiveness score.
Effectiveness	Percent of parts that consistently matched. This number should be within the confidence bounds for the other appraisers.
95% LCL	A 95% Lower Confidence Limit for the Effectiveness score.

Miss Rate Analysis Tab



The following fields compare each appraiser to the reference value from a variable gage. The system column compares the appraisers, as a group, to the reference values from the variable gage.

Miss Rate per Trial

Field/Button	Description
Effectiveness per trial	The percent of trials that agreed with the variable gage.
False Negative	The percent of trials that rejected when the variable gage accepted.
False Positive	The percent of trials that accepted when the variable gage rejected.
Total	All the percentages add up to 100%.

Miss Rate Per Part

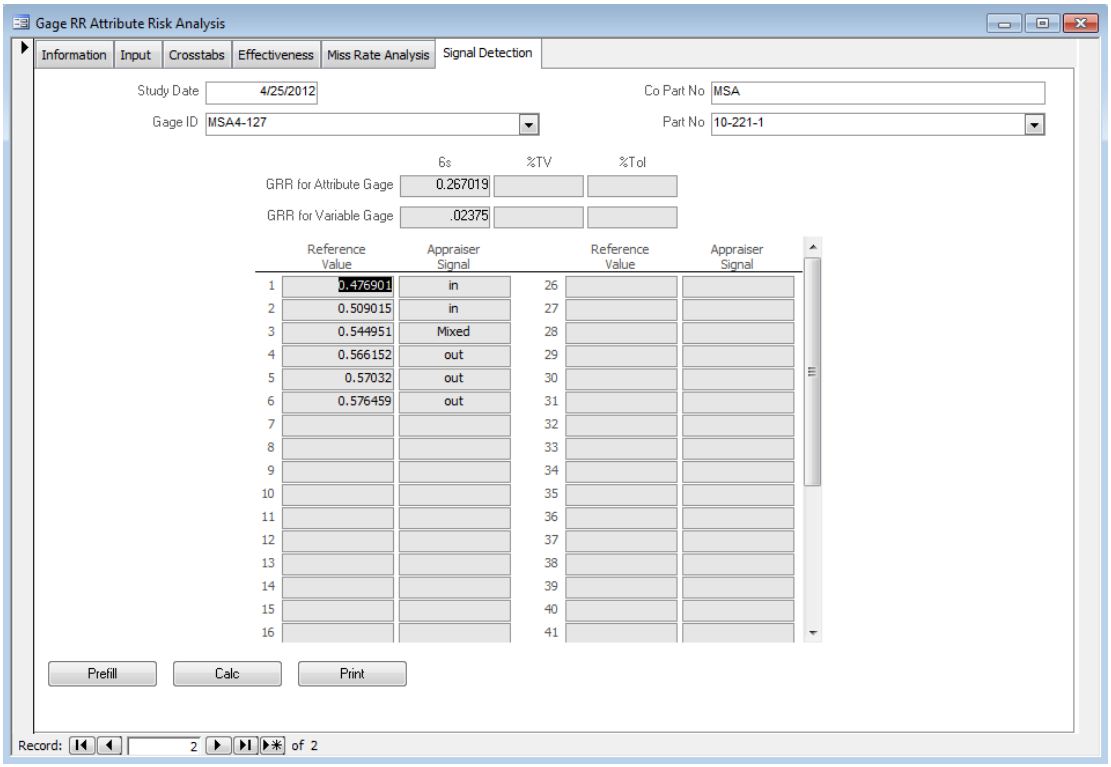
Field/Button	Description
Effectiveness per part	The percent of parts that consistently matched the variable gage.
False Alarm Rate	The percent of parts that were accepted by the variable gage and had at least one rejection by the appraisers.
Miss Rate per Part	The percent of parts that were rejected by the variable gage and had at least one acceptance by the appraiser(s).
Total	The percentages add up to 100%.

Study Effectiveness Summary

Field/Button	Description
Effectiveness per Part	The percent of parts that consistently matched the variable gage.
False Alarm Rate per trial of acceptable parts	The percent of parts that were accepted by the variable gage and were rejected by the appraisers.
Miss Rate per trial of unacceptable parts	The percent of parts that were rejected by the variable gage and were accepted by the appraisers.

Signal Detection Tab

If reference values are available from a variable gage, this tab estimates Gage Repeatability (GRR) for the attribute gage.



Signal detection has the following fields and buttons:

Field/Button	Description
GRR for Attribute Gage	GRR is estimated as the range from consistently "out" to consistently "in". If the study includes Upper and Lower Specification Limits GRR will be an average range, and GRR% of Tol will also be calculated. Assuming the attribute gage is for sorting or validation, and is not used for process control, the criterion is GRR % of Tol of 10% or less is acceptable. GRR % of Tol over 30% is unacceptable.
GRR for Variable Gage	The GRR that was entered on the information tab.
% of TV	GRR divided by Total Variation. Under 10% is acceptable, 10 to 30% may need improvement, over 30% is not acceptable.
% of Tol	GRR divided by Tolerance. Under 10% is acceptable, 10 to 30% may need improvement, over 30% is not acceptable.
1-50	The Reference Values from the variable gage sorted in ascending order, and the corresponding Appraisal Signal.

Crosstabulation Formulas

OC = observed count

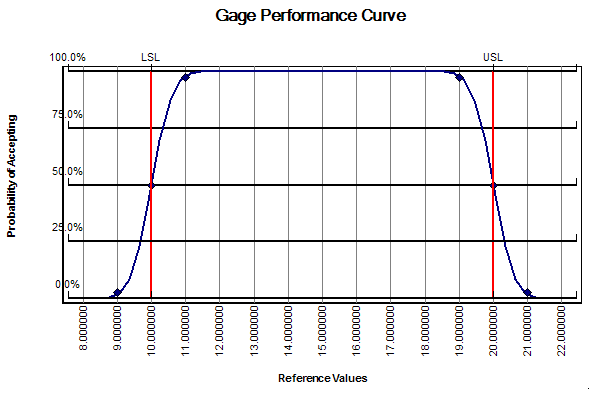
EC = expected count

$$\mathrm{EC} = \frac{\sum OC(row) \times \sum OC(column)}{\sum OC(all)}$$

$$\mathrm{kappa} = \frac{OC(agree) - EC(agree)}{\mathrm{EC(disagree)}}$$

Attribute Analytic

Gage theory tells us that a gage with no bias should have a fifty-fifty probability of accepting a part that was made exactly on a specification limit. That is true of both attribute and variable gages. It is also true for both types of gages, that because of repeatability problems, parts just inside the limit will have a probability of acceptance that gradually increases to 100%, and parts just outside the limits will have a probability of acceptance that gradually decreases to 0%. A chart called a Gage Performance Curve shows how this works for both attribute and variable gages:

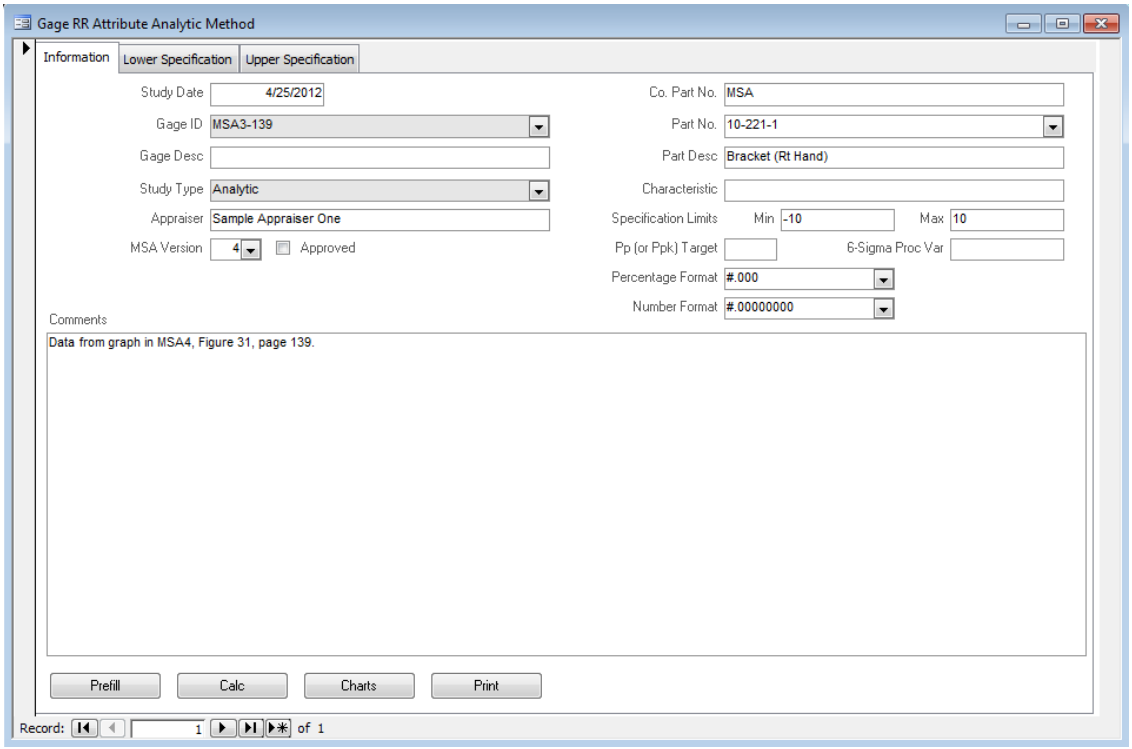


The chart shows how the probability of acceptance gradually changes in an ∫ curve near the Specification Limits. The horizontal width of the ∫ curve is about six times the Repeatability, and the horizontal distance between a specification limit and the 50% point on the curve is Bias. With the data for making this chart GAGEtrak is able to calculate Repeatability and Bias for an attribute gage.

To plot this chart for attribute gages we need parts that are made near, and on both sides of, a specification limit. The study can be done at either specification limit, or at both limits. We need variable measurements in addition to attribute data for each part used in the study. Only eight parts are needed for the study, but since we need to find parts that meet certain criteria we often have to check more than eight parts. The attribute data consists of checking each part twenty times and recording how many times the part is accepted. We do this until we have found at least one part that is accepted zero times, at least one part that is accepted twenty times, and at least six parts with acceptance counts that can be anywhere from one to nineteen. In case there are extra parts, GAGEtrak will allow up to three entries for each acceptance count. (In case there are more than three parts for a certain acceptance count, there are instructions on how to choose which three to include).

When you click the Calc button, GAGEtrak adjusts the percent accepted for each part and converts it to a “normal score” which makes the ∫ curves plot as diagonal straight lines. GAGEtrak then uses linear regression to calculate repeatability and bias.

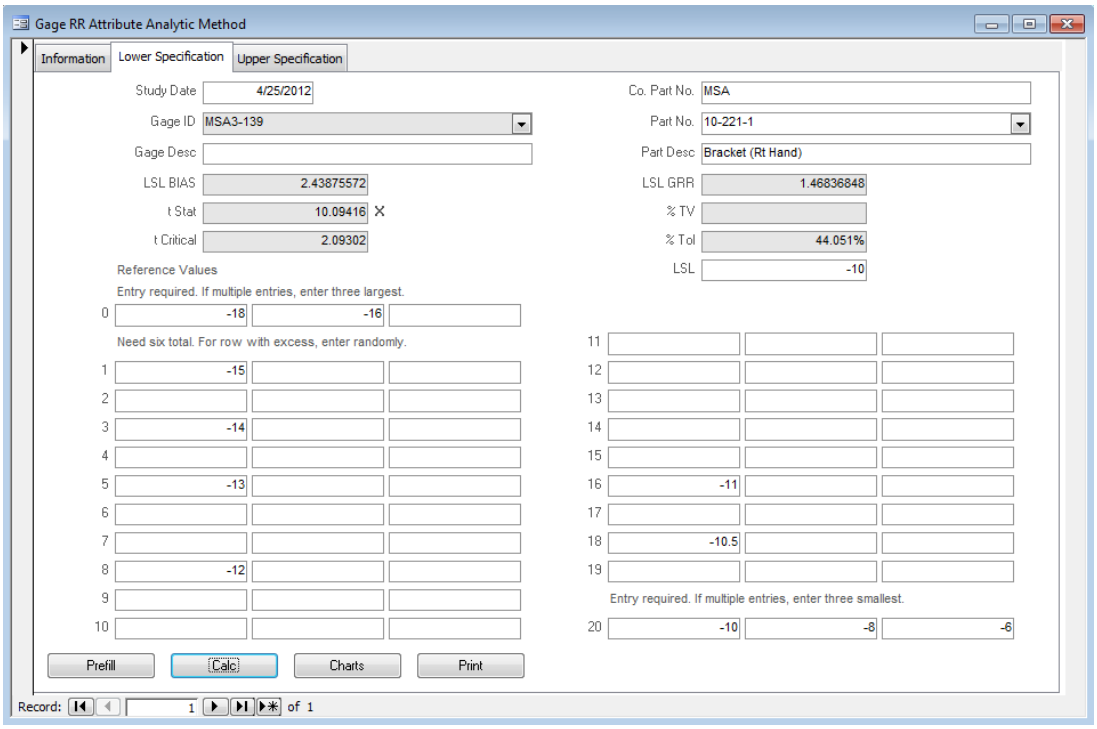
Information Tab



The Information tab contains these fields and buttons:

Field/Button Name	Description
Study Date	This field defaults to the current date, but you can change it.
Gage ID	Select the ID code for the gage you're using in the study.
Gage Desc	Once you select a gage ID, the gage's description will appear in this field.
Study Type	Analytic is the only type in this module.
MSA Version	Refers to the Measurement Systems Analysis Reference Manual. Use Version 4 for new studies. Existing Version 3 studies may be updated for new features by changing to Version 4. Updates are reversible.
Approved	Select if study is approved.
Comments	Enter any comments, such as the gage I.D. of a variable gage to be used for cross checking.
Co Part No	Enter your internal company part or job number, if relevant.
Part No	Select a related part number, such as the customer or supplier part number, if relevant.
Part Desc	This field displays the description or name of the part, if relevant.
Characteristic	In this field, you'll see the characteristic that you are evaluating.
Specification Limits	Be sure to enter the minimum and maximum Specification Limit values; otherwise, the software can't calculate the % tolerance values for your study.
Pp (or Ppk) Target	A process capability or performance target may be entered (typically 1.33 or 1.67). GAGEtrak will use it to reduce Tolerance to be an estimate of Process Variation.
6-Sigma Proc. Var.	If you know the 6-Sigma Process Variation of the characteristic that you're measuring, enter it here. It will be divided by 6 and used for Total Variation TV.
Percentage Format	Select the format you want for calculations.
Number Format	Select the format you want for calculations.

Lower Specification Tab



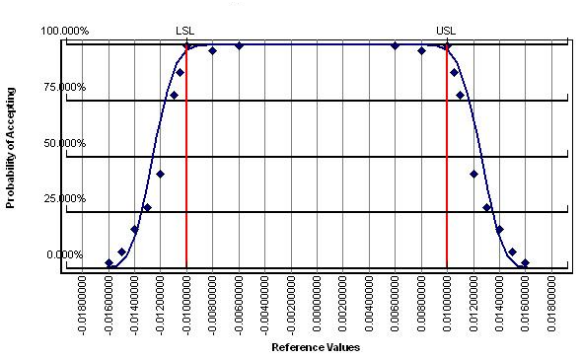
Field/Button Name	Description
LSL BIAS	Bias for the Lower Specification Limit. LSL Bias will appear after you enter LSL data and click on Calc.
t Stat	The Bias number is converted to a t-Statistic. The absolute value should be smaller than t-Critical.
t Critical	A 95% confidence limit for t-Stat.
LSL GRR	Gage Repeatability and Reproducibility (GRR) for the Lower Specification Limit. LSL GRR will appear after you enter LSL data and click on Calc.
% TV	Percent of Total Variation.
% Tol	Percent of Tolerance.
LSL	Lower Specification Limit.
0 (zero)	Enter a variable measurement for at least one part that was accepted zero times out of twenty. If you have more than three such parts enter the three *largest*.
1-19	Enter variable measurements for six or more parts with acceptance counts between one and 19, out of twenty. If you have more than three parts with the same acceptance count, then enter them randomly.
20	Enter a variable measurement for at least one part that was accepted twenty times out of twenty. If you have more than three such parts enter the three *smallest*.

Upper Specification Tab

Field/Button Name	Description
USL	Enter the Upper Specification Limit.
USL GRR	Gage Repeatability and Reproducibility (GRR) for the Upper Specification Limit. (Attribute Gages may use different methods for upper and lower specification limits. Therefore each has it's own GRR). This will appear after you enter data and click on Calc.
USL Bias	Bias for the Upper Specification Limit. This will appear after you enter data and click on Calc.
0 (zero)	Enter a variable measurement for at least one part that was accepted zero times out of twenty. If you have more than three such parts enter the three *smallest*.
1-19	Enter variable measurements for six or more parts with acceptance counts between one and 19 out of twenty. If you have more than three parts with the same acceptance count then enter them randomly.
20	Enter a variable measurement for at least one part that was accepted twenty times out of twenty. If you have more than three such parts enter the three *largest*.

Gage Performance Curve

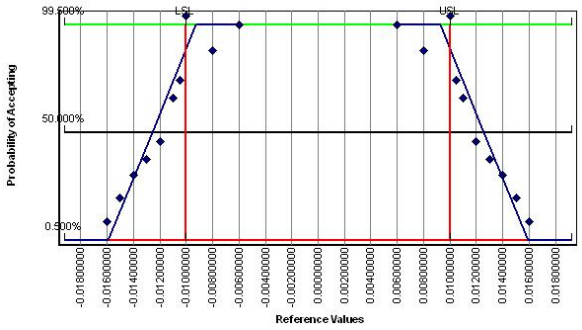
This chart shows how the probability of acceptance gradually changes in an ∫ curve near the Specification Limits. The horizontal width of the ∫ curve is about six times the repeatability, and the horizontal distance between a specification limit and the 50% point on the curve is bias. The repeatability and bias are not necessarily the same at both specification limits.



Performance Curve Probability Plots

This chart uses a special scale that makes the Gage Performance Curve look like a series of straight lines. The horizontal width of the diagonal line is 5.15 times the Repeatability, and the horizontal distance between a specification limit and the 50% point on the

corresponding diagonal line is Bias. The repeatability and bias are not necessarily the same at both specification limits.



This chart shows how the probability of acceptance gradually changes in an ∫curve near the Specification Limits. The horizontal width of the ∫ curve is about six times the Repeatability, and the horizontal distance between a specification limit and the 50% point on the curve is Bias.

Attribute Analytic Formulas

C = acceptance count

P = probability of a particular acceptance count

x = normal score (plots on vertical scale, in this case)

y = variable measurement (plots on horizontal scale, in this case)

$\hat{y}$ = predicted variable measurement

b = intercept

a = slope (horizontal/vertical, in this case)

n = sample size

Adjustment for Discrete Data

Adding or subtracting 0.5, to make the number closer to 10, adjusts each acceptance count to calculate P values that convert well to normal scores. For example, P(0) = (0 + 0.5)/20 = 0.025. A table of the normal distribution will show that the corresponding normal score is –1.96.

Table of Counts, Probabilities and Normal scores

C	0	1	2	3	4	5	6	7	8	9
P	0.025	0.075	0.125	0.175	0.225	0.275	0.325	0.375	0.425	0.475
x	-1.96	-1.44	-1.15	-0.93	-0.76	-0.65	-0.45	-0.32	-0.19	-0.06

C	10	11	12	13	14	15	16	17	18	19	20
P	0.5	0.525	0.575	0.625	0.675	0.725	0.775	0.825	0.875	0.925	0.975
x	0.00	0.06	0.19	0.32	0.45	0.65	0.76	0.93	1.15	1.44	1.96

Note: When there are multiple parts with a count of zero (or twenty), only the one closest to the average will be used in the linear regression. The extra parts will be plotted on the charts, but will not affect calculations.

Separate linear regressions are done for upper and lower specification limits. The custom for these charts is opposite of the usual practice: x, or P, will plot on the vertical scale, and y will plot on the horizontal scale.

$$\hat{y} = b + a \times x$$

$$a = \frac{\Sigma xy - \left(\Sigma x \frac{\Sigma y}{n}\right)}{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}$$

$$b = \Sigma \frac{y}{n} - a \times \left(\Sigma \frac{x}{n}\right)$$

Bias = Specification Limit – b

$$GRR = \frac{\hat{y}(\text{at } x = 2.576/1.08) - \hat{y}(\text{at } x = -2.576/1.08)}{5.152}$$

The 1.08 empirical correction factor compensates for the adjustment that was made above to the P values. On the probability plot, the regression line ends at ± 2.576/1.08.

MSA v2 studies

For customers coming to the current versions of GAGEtrak from earlier versions, the MSA v2 are provided for backward compatibility so that users can view older records created in those versions. Hence, they cannot be used for new records. There are five options for MSA v2 studies; namely, MSA2 Average and Range, MSA2 Linearity, MSA2 Stability, MSA2 Attribute and MSA2 ANOVA. Please refer to the older manuals for a description of these options.

Other Techniques/References

GAGEtrak includes the basic measurement system analysis (MSA) techniques. These rely on proven statistical tools such as Confidence Interval Determination, Control Charting, Performance Curve Plotting, and ANOVA. For more information on how the tools work, see, especially NIST/SEMATECH, Duncan, or Box in the list below. To view the studies in GAGEtrak see AIAG chapter 3. To see alternative or special purpose applications for MSA, see AIAG, or NIST/SEMATECH. For examples using uncertainty to summarize MSA studies, see EA-4/02 and NIST/SEMATECH (where websites are referenced, the publications can be freely viewed online, downloaded, or both).

We used the following publications as references in developing MSA studies; we recommend them to expand your understanding of measurement system analysis: AIAG, MSA Measurement Systems Analysis Reference Manual, Forth Ed., Chrysler Group, Ford, General Motors, 2010 (highly recommended—to order a copy, call AIAG at (248) 358-3570 and ask for document number “MSA”).

AIAG*, MSA Measurement Systems Analysis Reference Manual,* Third Ed., DaimlerChrysler, Ford, General Motors, 2002 (*highly recommended*—to order a copy, call AIAG at (248) 358-3570 and ask for document number “MSA”).

ASTM, Special Technical Publication 15D, Manual on *Presentation of Data and Control Chart Analysis,* 1976.

BOX， G. E. P., Hunter, W. G., Hunter J. S., *Statistics for Experimenters*, John Wiley & Sons, New York, 1978.

DUNCAN, A.J., *Quality Control and Industrial Statistics*, Fourth Ed., Richard D. Irwin, Inc., Homewood, Illinois, 1974.

EA-4/02, *Expression of the Uncertainty of Measurement in Calibration*, 1999, www.european-accreditation.org/pdf/EA-4-02ny.pdf.

GRUBBS, F. E., *"Errors of Measurement, Precision, Accuracy and the Statistical Comparison of Measuring Instruments, Technometrics"*, Vol. 15, February 1973.

HICKS, C. R., *Fundamental Concepts in the Design of Experiments*, Holt, Rinehart and Winston, New York, 1973.

ILAC, G17:2002, *Introducing the Concept of Uncertainty of Measurement in Testing in Association with the Application of the Standard ISO/IEC 17025*, 2002, www.ilac.org.

ISO, *Guide to the Expression of Uncertainty in Measurement*, 1993, (Revised 1995).

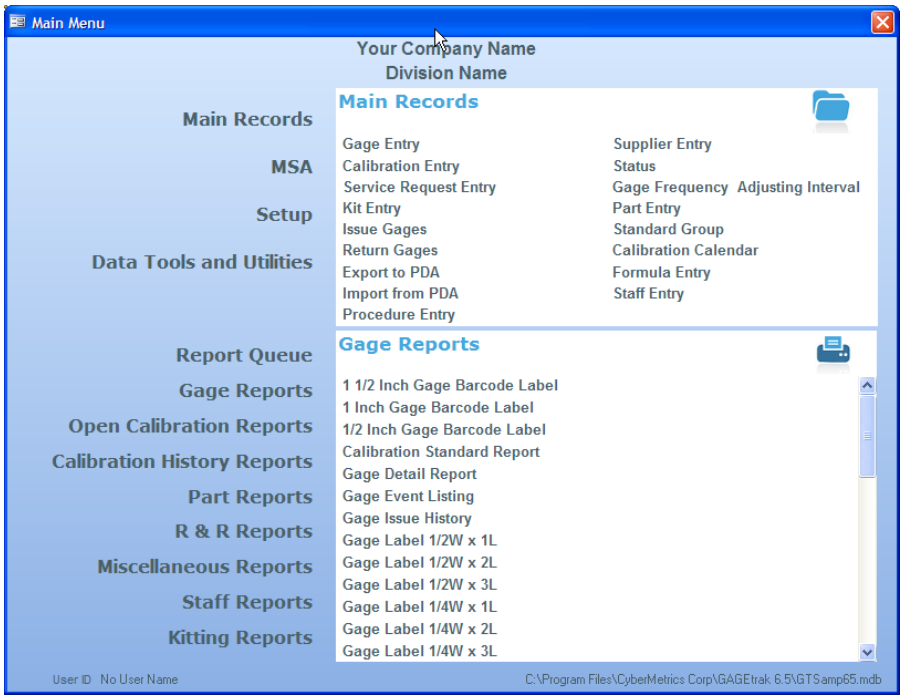
NIST, TN 1297, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, 1994, www.nist.gov/public_affairs/pubs.htm

NIST/SEMATECH, *e-Handbook of Statistical Methods*, www.itl.nist.gov/div898/handbook/

WESTERN ELECTRIC, *AT&T Statistical Quality Control Handbook*, Charlotte, NC, Delmar Printing Company, 1984.

Chapter 13: Reports

GAGEtrak includes a large variety of standard reports. To generate reports, go to the main menu and select the type of report you would like to view. The reports are available in the bottom section of the Main Menu as shown below.



Each standard report starts with a filter window that allows you to select a specific group of records for the report. There are a few reports, such as the Calibration Due Listing report, that are time-based; which allows you specify a *From* and *To* date range for selected criteria. All reports were designed using standard Windows True Type fonts.

Report Commands and Functions

Viewing Reports

You can preview any report by clicking the View button in the filter. After the report appears, you can use the vertical and horizontal scroll bars to view different parts of the report, or use the page navigation buttons to view multiple pages of the report. Use the Zoom In or Zoom Out buttons on the menu to view more or less of the report.

Report Preview Toolbar

GAGEtrak's Report toolbar contains common commands that you can use for reports. Each toolbar button is described below.

Button	Description
Print Print	To print the current report, click on this button. You may also print by using the keyboard shortcut *Ctrl-P.*
Copy	To copy the current report as formatted text, click on this button.
Single Page	To view the current report one page at a time, click on this button.
Multiple Page	To view the current report more than one page at a time, click on this button.
Zoom Out	To view the current report at a smaller size, click on this button.
Zoom In	To view the current report at a larger size, click on this button.
100 %	To view the current page at a specific size, use this drop-down list to select a specific percentage value for magnification, or to fit the page into the window.
Send Send	To e-mail the current report, click this button.

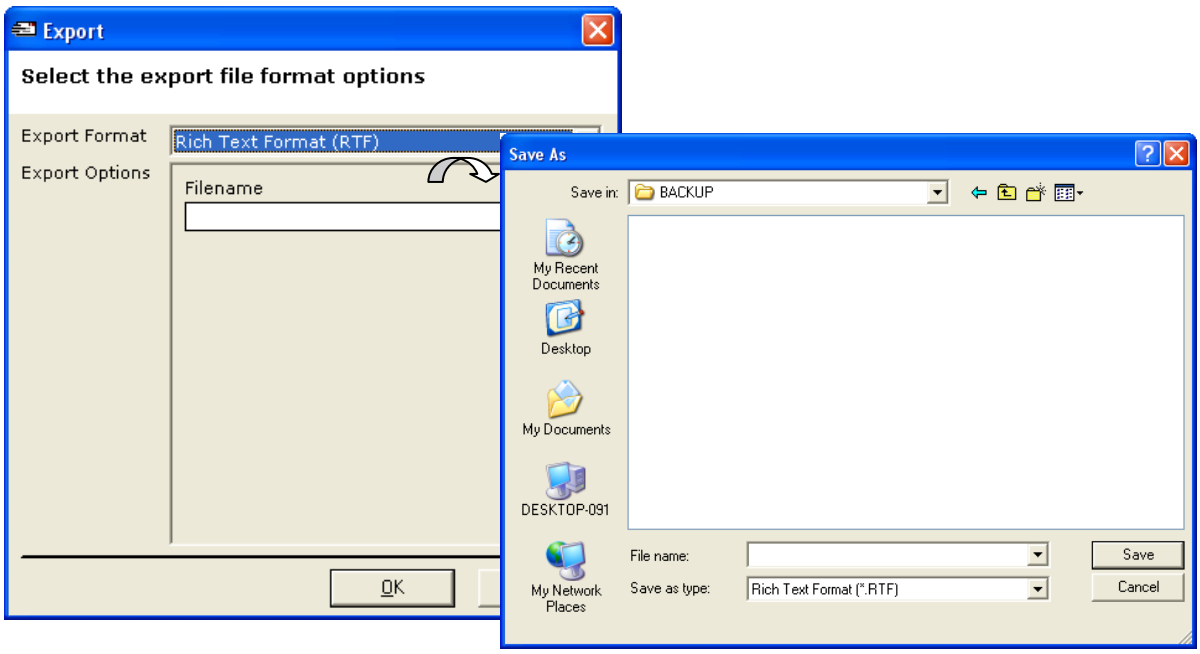
To view different pages in Print Preview use Page 1 of 2 or:

Press	To
PAGE DOWN	Move to the next page
END	Move to the last page
PAGE UP	Go to the previous page
HOME	Move to the first page

Output To

The Output To export formats for reports from the File menu allows you to transmit reports to Rich Text Format (*.RTF), Portable Document Format (*.PDF), HTML (*.HTM; *.HTML), Microsoft Excel (*.XLS), Tagged Image Format (*.TIF), and MS-DOS Text (*.TXT). If you save a file in .RTF format and then open that file in a word processing application, such as Microsoft Word, your data will have the appearance and formatting of the GAGEtrak report that you exported. If you output to a text file, all of the data will be present, but the formatting will be lost. Output to an Excel spreadsheet is the best option to select when you wish to export a report. Choose Portable Document Format to create a report that appears identical to the report you see in GAGEtrak; others will be able to print (but not edit) this report even if they do not have GAGEtrak, as long as they have the free Adobe Reader.

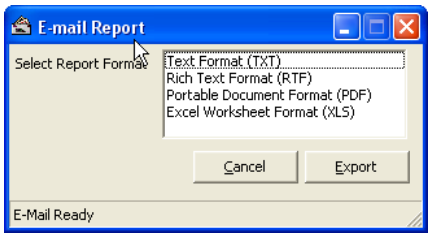
The following is an example of the Export Format and Export Options selections for reports:



Export Options allows you to select a save location.

Send

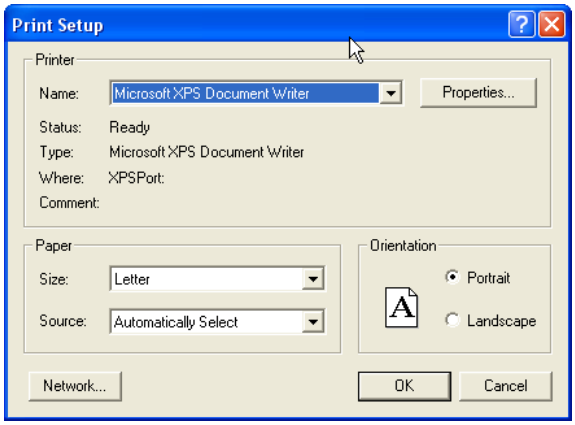
The Send command from the File menu allows you to output reports to Microsoft Outlook (or any MAPI compatible mail program). The output includes subforms and subreports. The file format and appearances are as shown below.



Print Setup

Select Print Setup from the File menu if you want to change report print settings, such as printer selections, paper size and source, or report orientation (Portrait or Landscape). For more information on how to set up page characteristics, refer to Report Settings in *Customizing Reports* in the *System Administrator's Guide*.

The type of printer driver installed controls some options, but a typical setup window looks like this:



Tip: To save paper and time, first view the report on-screen and then adjust the print setup values. Any changes will be visible on-screen after you click the *OK* button. When you close the report window, the program will save the new settings.

Report Descriptions

This table contains a description of the most commonly used reports, including special filtering options.

Report	Description
REPORT QUEUE	This feature allows users to *Save, View, Print* and *Print All* commonly used report filter criteria. Once you have a report filter set up as required, simply add the filter criteria to the queue. These saved filters can be retrieved at a later date, or printed directly from the reports queue. Users can save multiple sets of criteria for each report; report criteria may be fixed dates such as January 1, 2009, or variable dates such as "30 days before the current date." Report Queue allows several reports to be printed consecutively.

GAGE REPORTS	
Report	**Description**
Gage Bar Code Labels	Use any of these reports to print a pre-designed bar code or group of bar code labels. Make sure that the label height matches the cartridge installed on your label printer
Gage Detail Report	Use this report to see a comprehensive gage report, including record details.
Gage Issue History Report	For a complete list of gage issue history, use this report.
Gage Labels	Use any of these reports to print a pre-designed label. Make sure the right printer cartridge is installed before selecting the print button.
Gage Listing by…	Select a report "by" specific report for viewing / printing specific information.

OPEN CALIBRATION REPORTS

Report	Description
Calibration Due Listing by…	Select a report "by" specific report for viewing / printing specific Calibration Due Listing information. You can sort the list by several different fields, such as *Gage ID*. **Important: The Calibration Due Listing report lists only gages that you assigned as *Active* (status ID 1) in Gage Entry. Also, reports with a calibration frequency of *Usage* or *Cycles* that are not past due for calibration will present an asterisks " * " to the right the Next Due Date denoting the date as an Estimated Due Date.**
Calibration Schedule by…	Select a report "by" specific report for viewing / printing specific Calibration Schedule information. If you have a large gage inventory with a variety of calibration frequencies, it's difficult to plan your workload. This powerful report makes this task easier by helping you predict calibrations that are due during a specific time frame. It builds a temporary schedule for each gage and then summarizes the findings, taking your skip days/dates into account. Use this report as a labor and cost-planning tool. After you enter any filter values, click *View* to view the schedule. **Tip: Don't use too wide of a date range, such as a 10-year span, as it can take a long time to generate. If the schedule takes too long, press CTRL-BREAK to stop it, then try a smaller date range.** **Schedule report options include:** *Include days with no activity*—If you want your report to include *complete time frames*, check this box to include days on which calibrations aren't scheduled. For example, suppose you wanted to create a schedule for January through March, and no calibrations were due in February. If you left this box un-checked, your report would show January and March, but not February. If you checked this box, the report would include February. *Default Hours*—GAGEtrak uses this value for gages that don't have an estimated calibration length (i.e., their *Calibration Hours* fields are blank). For example, if you enter 0.5, GAGEtrak assigns a half-hour of time only to those gages. If you entered *Calibration Hours* for your gages, leave this field blank. *Schedule Type*—Use this field to select how to summarize your schedule–by day, week, month, quarter, or year. Select *By Day With Details* for a comprehensive listing. **Tip: You can print more than one schedule type without having to re-generate the schedule each time.**
Calibration Work Order	Use these forms to gather calibration data and document work assignments for your personnel.

CALIBRATION HISTORY REPORTS

Report	Description
Certificate of Calibration	Calibration certificates prove that you've performed the proper calibrations and that the procedures used meet/exceed certain minimum requirements. GAGEtrak retrieves the certificate information from **Calibration Entry**. You can update only three fields in the report screen: *Customer Information*, *Statement*, and *Uncertainty Format*. If you need to add or edit other information, go to **Calibration Entry**. *Customer Information*—Enter what you want to print on the certificate. This might include the customer's company name, contact name, address, telephone number, or other important information. *Statement*—You can edit the calibration statement for each certificate. Any changes you make to the calibration statement apply only to that record. If you want to change all future calibration statements, go to **Settings—Calibration Options** (see the *System Administrator's Guide*). *Uncertainty Format*—Use the dropdown list box to select the number format for the sum of uncertainty standards that you used to calibrate the gage. You can view or print certificates for the most recent calibration or for all calibrations by using the *View/Print Current* or *View/Print All* buttons at the bottom of the window. The Quick Filter or Advanced Filter can be used to select the certificates to print.
Calibration Costs and Labor Report	Use this report to track your calibration costs for each gage, department, location, account number, calibrator, or other criteria.
Calibration Labels (Batch)	You must have the optional Calibration Label Kit to print labels. You can print a batch of calibration labels based upon the calibration date, gage ID, location, or description for any existing calibration records. **Tip: Use this report to print your calibration labels at the end of the day in one batch. This method eliminates the blank waste tape that prints for each label you print from Calibration Entry. You'll still get an initial piece of waste tape, but after that, the printer adjacently ejects and cuts your labels.** To preview a label, check the *Preview* box and click the label button. To print a label, clear the *Preview* box, then click the label button. Be sure to install the appropriate label tape in your printer.
Calibration History	To see a list of calibration history, select this report. Enter the dates for the time frame in question along with any other filters. Check the *Calibration Meas.* box to include the table of calibration measurements used for each calibration.
Standards Traceability Report	Use this report to provide traceability for your calibration and reference standards.

PART REPORTS

Report	Description
Gage Requirements by Part	This report prints gage requirement sheets.
Part Bar Code Labels	Use these reports to print part bar code labels.

Part Listing	These reports list parts, including descriptions and uses.

R&R REPORTS

Report	Description
R&R Due Listing by…	Select a report "by" specific report for viewing / printing specific R&R Due Listing information. These reports lists gages that are due for R&R studies. Reports for each R&R study may be printed from Gage R&R.

MISCELLANEOUS REPORTS

Report	Description
Audit Log Detail	Lists all user activity, including audit ID, date / time, user, object action, data key and field old and new values.
Supplier Listing	This report lists your suppliers. Check *Enabled* to see only active suppliers. To see both active and inactive suppliers, uncheck *Enabled.*
Procedure Listing	To see a list of calibration procedures, choose this report. Check the *Summary Listing By Gage ID* box to include the gages linked to each procedure.
Corrective Action/ Service Requests	Use this report for a list of open or closed corrective action or service requests. For each request, the report lists the date, supplier, requester, gage ID, type of request, and status.
Group Permissions and Users	This report prints a complete listing of group permissions and users and their access permission on the forms, reports and controls of the program. Access to this and all other reports can be limited through Security.
MSA Summary Report	At a glance – MSA V2 and MSA V3 study type totals.

STAFF REPORTS

Report	Description
Gage Authorized Users	This report lists your suppliers. Check *Enabled* to see only active suppliers. To see both active and inactive suppliers, uncheck *Enabled.*

KITTING REPORTS

Report	Description
Kit Listing	Lists all, or one specified kit, and its associated Required Gage Types and Required Gage information.

For information on editing these reports and creating new reports, see *Customizing Reports* in the *System Administrator's Guide*.

Appendix A:

Calibration Label Kit

The following instructions will help you install and set up the optional GAGEtrak Calibration Label Kit.

You can use the kit to print durable, oil-resistant, adhesive backed calibration labels for your gages, test equipment, and calibration standards. The kit includes a dedicated Brother P-Touch PC label printer, cables, black-on-white tape cartridge, and software drivers for Windows and Macintosh. If you ordered extra tape cartridges, they are enclosed with your kit.

Installing the Label Printer and Windows Software

First, attach the Brother P-Touch PC printer's serial port and cables, and then put the tape cartridge into the printer. Next, install the *P-Touch PC Editor for Microsoft Windows* software. See the enclosed Brother booklets for more detailed instructions.

Printing Calibration Labels

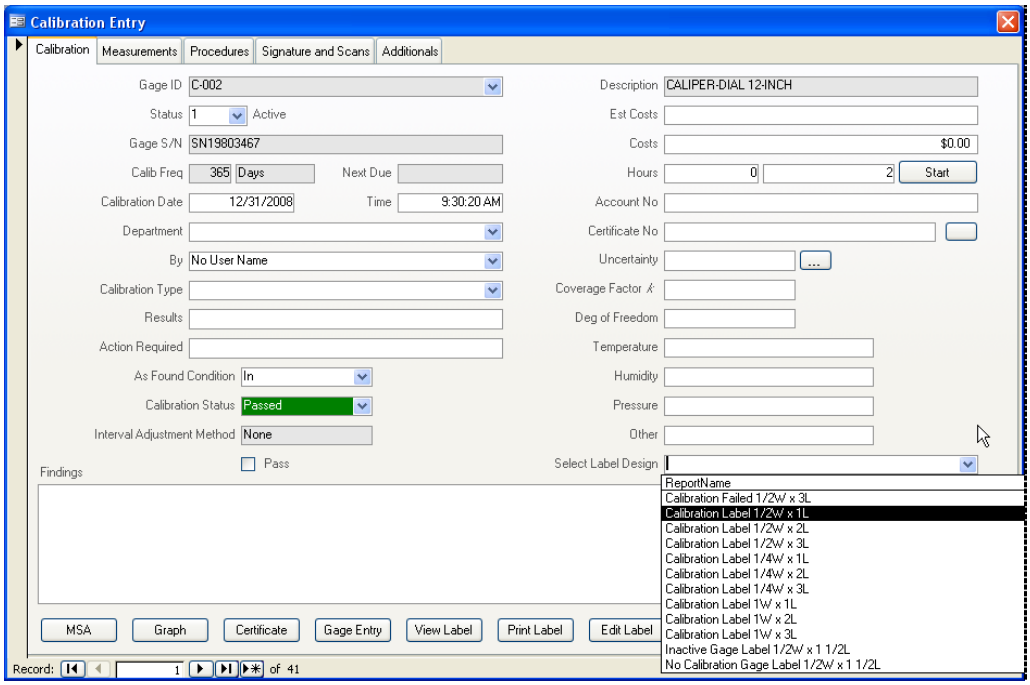
GAGEtrak can print standard calibration labels in widths of 1½", 1", ½", and ¼". Lengths are 1", 1½", 2", and 3". A sample label is shown below:

1-inch W x 1-inch L

Note: The label generator in GAGEtrak can generate custom size labels, but not all printers can support custom label sizes so it is highly recommended to consult your printer guide prior to proceeding.

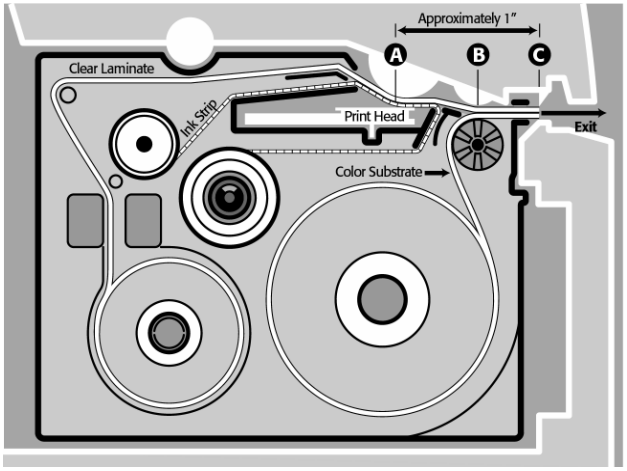
Printing Labels from Calibration Entry

You can print individual calibration labels directly from the Calibration Entry–Calibration tab:



To print a label, select the title of the desired label from the Select Label Design dropdown list, and then click on the Print Label button. The Print Label button will automatically send the label to the printer. The height shown in the height column of the drop-down list must match the height of the tape currently installed in your label printer.

Note: The P-Touch Label Printer ejects and cuts off a strip of blank label material approximately 1" long before printing. This is a direct result of the design of these label printers. The diagram below illustrates the mechanics of the P-Touch printer.

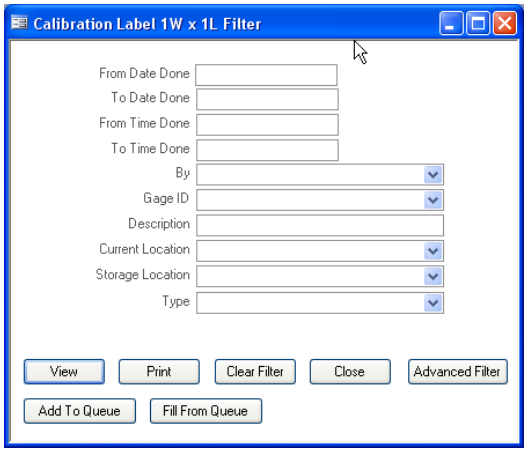


At point A in the diagram, the print head transfers ink from the ink strip to the back of the clear laminate. Rollers bond the color substrate and the clear laminate together at point B. The laminated tape is then fed out until it reaches the cutter at point C. The cutter is approximately one inch beyond the print head along the path of the tape; therefore, at the beginning of the printing process, about one inch of blank tape has already advanced past the print head. This problem cannot be eliminated; however, it can be mitigated by printing labels in batches rather than individually, since the printer will feed a blank strip only at the beginning of each batch of labels.

To *preview* a label select the View Label button. The View Label button will open the report editor allowing for viewing or editing of the label prior to printing.

Printing Labels from the Calibration Labels Report

To print labels in a batch, go to the main menu, then select the Reports icon and click on the report group Calibration History Reports. A list of reports will appear beneath this report group; click on the Calibration Label report that corresponds with the label size you wish to print. A filter window similar to the one below will appear:



You can use this window to filter for a group of calibration labels based upon *Calibration Date*, *Gage ID*, *Location*, or *Description* for any calibration record that exists in the database.

Below are brief descriptions of the fields and buttons in this window:

Field/Button Name	Description
From and To Date Done	Inclusive calibration dates.
From and To Time Done	Inclusive calibration times.
By	Name of calibrator.

Field/Button Name	Description
Gage ID	ID of specific gage. This will limit your label to one—for the specific gage ID only.
Description	Enter a description for the gage.
Current Location	The current location of the set of gages to be selected.
Storage Location	The storage location of the set of gages to be selected.
Type	The type of the set of gages to be selected
View Button	To see how your label will appear before you print it, click on this button.
Print Button	Prints labels
Clear Filter Button	Clears all filter entries
Close Button	Aborts label printing and goes back to the Custom Label Menu
Advanced Filter Button	Use this button to open the Advanced Filter window. You can then filter for a group of records that match the criteria you enter. You can also open previously saved criteria for use and create and save new criteria.
Add to Queue Button	Add filter file to printing queue. You can view and print the file from the Report Queue
Fill From Queue Button	Copy filter information from a saved file in the Report Queue

Viewing and Printing Labels

When you have finished entering your filter parameters, click on the View button to see a preview of your label. Make sure that the height of the tape cartridge in your label printer matches the height of the label you have selected under Calibration History Reports, then click on the Print button to print your labels.

Appendix B:
Gage Calibration and Control

This section discusses the basics of gage calibration and control; it's intended for users with limited experience, but it also serves as a review for more experienced users. A list of references is at the end of this section.

Purpose of Calibration

Gages, test equipment, and measurement standards are all susceptible to deterioration in accuracy during use and storage. To maintain accuracy in your measurements, you need an ongoing calibration system.

Calibration Terminology

Calibration

Unfortunately, the terminology associated with calibration control is not universally standardized. Typically, the term "calibration" means placing a gage, measurement standard, or test instrument into a state of accuracy. Calibration is also called "re-calibration" or "reconditioning".

Purchased Precision Standards

Companies buy these high accuracy measurement standards, such as gage blocks or standard load cells, from outside sources. These standards represent the highest degree of accuracy in a company. Usually, your only form of calibration control on one of these standards is your supplier's certification that the standard is traceable to the U.S. Department of Commerce's National Institute of Standards and Technology (NIST—formerly the National Bureau of Standards). Your supplier, an independent laboratory, or the NIST must perform any subsequent calibrations on these standards.

Purchased Working Standards

These standards aren't as accurate as the precision standards—they usually don't cost as much, either. You use them to check calibration internally before using gages or test equipment. You might calibrate these standards in-house, but more often you send them to an outside source for calibration.

Test Equipment

The term "test equipment" covers a variety of measuring equipment, sometimes including working standards. You use this equipment to check your products and manufacturing processes. Check test equipment for calibration before you use it—even if it's brand new.

Test Materials

This term refers to all consumable standards, such as films or liquids, used in calibrating test equipment. Since variability in these materials can affect your measurements and calibrations, suppliers often give you data on the test material's variation.

Gages (or Gauges)

This term applies to many measurement inspection devices, including fixed-limit (attribute or go/no-go) and variable (actual numeric measurement) gages. Usually, your company calibrates this type of equipment internally, using either working or precision standards. You can calibrate fixed-limit gages by using working standards or dimensional layout. For simplicity throughout this manual, we use the term "gage" to refer to all measurement equipment.

Inventory and Classification

To begin your gage control system, take an inventory of your gages. During this initial inventory (usually the most difficult), determine origins, locations, types, and calibration schedules, then assign identification numbers and collect additional information to classify your gages. In the past, companies manually recorded this information on gage record cards—that's where GAGEtrak comes in. Instead of sifting through hundreds of cards to find gages due for calibration, GAGEtrak automates the task, letting you selectively create a list of these gages.

Calibration Schedules

You usually determine calibration schedules by the gage's classification. You can establish initial calibration schedules by expected usage, engineering judgment, and bargaining. As you gather actual calibration information, you might need to adjust the schedules. The primary intent of a calibration schedule is to detect accuracy deterioration *prior* to intolerable levels of accuracy. Accuracy deterioration usually results from gage usage; less often, it results from the passage of time.

The most common methods for determining calibration schedules are:

- Elapsed calendar time—the most popular method, it establishes a fixed calendar time, such as 90 days, as a checking interval
- Actual amount of usage (time and cycles)—based on counting the number of days (or operating cycles) for which the gage was used (you can keep this count manually or automatically)
- Actual operating time—an excellent method for electrically driven gages (a device used for measuring actual operating time is called a "coulometer")

Calibration Practice

To ensure consistency in your calibration techniques, develop procedure manuals of calibration practices. At minimum, include tolerances for accuracy; standards; temperature and humidity controls (if needed); time cycles; human technique; and other important factors.

After calibration, make the equipment tamper-proof (if possible) with sealed adjusting screws, lead-sealed lock wires, stamps, and other devices.

Record the results of your calibration checks and any required adjustments or repairs. At minimum, record the following information:

- Date on which calibration was checked
- Person that checked calibration
- Any deficiencies seen in the equipment
- Accuracy data (if able to measure accuracy)
- Causes for out-of-calibration conditions

- Repair time and calibration time

Review this information periodically to see if you should reduce checks on stable equipment; increase checks on unstable equipment; or redesign/replace the measurement equipment.

References

The following books and publications discuss gage calibration and control:

JURAN, J.M., *Juran's Quality Control Handbook,* Fourth Ed., 1988.

JURAN, J.M., *Quality Planning and Analysis,* Second Ed., 1980.

FARAGO, Francis T., *Handbook of Dimensional Measurement,* Second Ed., 1982.

National Conference of Standards Laboratories (NCSL), *Establishment and Adjustment of Calibration Intervals (RP-1),* Second Ed., 1989.

U.S. Dept. of Defense, MIL-STD-45662A, Calibration System Requirements, 1988.

Resources for Books, Publications, and Reference Materials

American Society for Quality Control (ASQC)

Phone numbers: (800) 248-1946 (North America only) or (414) 272-8575

National Conference of Standards Laboratories (NCSL)

Phone number: (303) 440-3339

National Institute of Standards and Technology (NIST)

Phone: (301) 975-NIST (6478)

American National Standards Institute (ANSI)

Phone: (212) 642-4900

American Society for Testing and Materials (ASTM)

Phone: (610) 832-9585

The Naval Publications and Forms Center

5801 Tabor Ave., Philadelphia, PA 19120

System Administrator Guide

Chapter 1: Installation

You can use GAGEtrak 6.7 on a single workstation, on a network, or in a client/server environment—installation will vary slightly for each of these options. This chapter gives you general installation instructions for all options. Chapter 2 deals specifically with setting up an MS SQL client/server system.

Installation

Files

The root directory of the CD contains all the files required to run GAGEtrak.

Installation Options

You can use GAGEtrak 6.7 as a client/server program, with one centralized, dedicated computer hosting the database and one or more user workstations accessing the database from that server. You can also choose to install and use GAGEtrak on only one PC (a single-user setup).

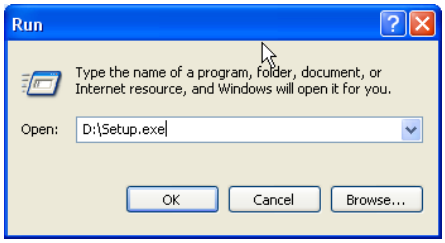
If you have a multi-user license of GAGEtrak, you and your other GAGEtrak users can install the program from the CD or from a network location. If you want your users to install from a network location, copy all of the files in the root directory of the CD to the same network location and then instruct users to run SETUP.EXE from that location.

To install GAGEtrak, follow these instructions:

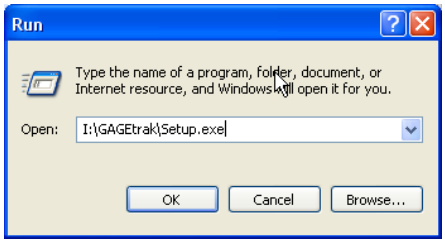
1. To begin installation, click the Windows Start button and select the Run . . . command. Click the Browse button to navigate to your CD-ROM or network

drive, then select `SETUP.EXE`

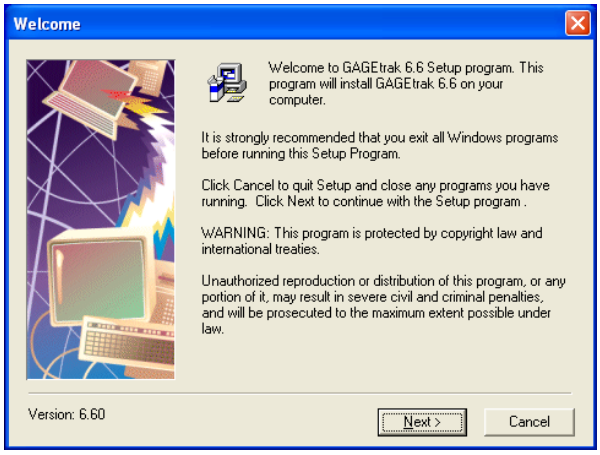
The sample screens show a CD and a network installation.



or

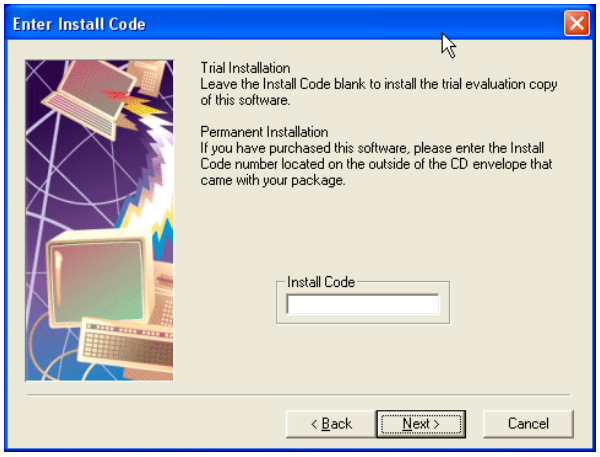


2. Next, you'll see the Welcome screen. Make sure that you've closed all other programs, and then click Next.


Welcome
Welcome to GAGEtrak 6.6 Setup program. This program will install GAGEtrak 6.6 on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup Program.
Click Cancel to quit Setup and close any programs you have running. Click Next to continue with the Setup program .
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Version: 6.60
Next >
Cancel

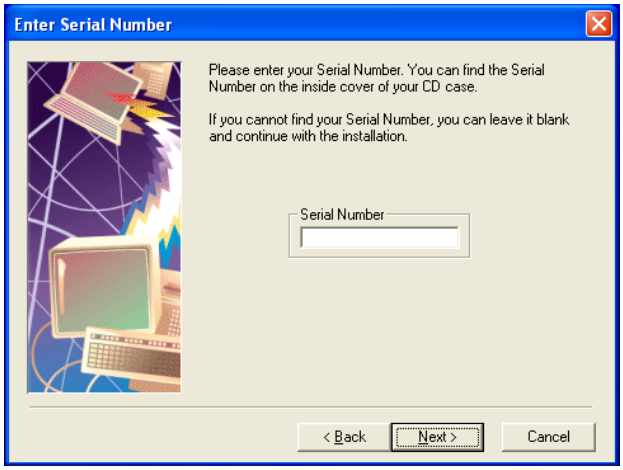
3. In the next screen, enter the install code for your copy of GAGEtrak. You can find this code inside the CD case that came with your software package.

Tip: If you don't have an install code, leave this field blank.

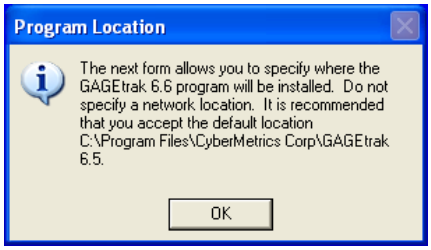

Enter Install Code
Trial Installation
Leave the Install Code blank to install the trial evaluation copy of this software.
Permanent Installation
If you have purchased this software, please enter the Install Code number located on the outside of the CD envelope that came with your package.
Install Code
< Back
Next >
Cancel

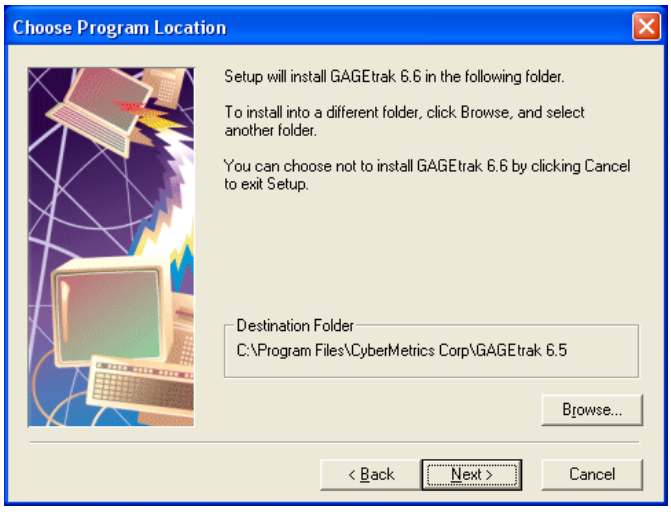
4. If this is a new, permanent installation, you will be prompted for a Serial Number. You can find your Serial Number inside the CD case that came with your software package.

Tip: If you don't have an Serial Number, leave this field blank.


Enter Serial Number
Please enter your Serial Number. You can find the Serial Number on the inside cover of your CD case.
If you cannot find your Serial Number, you can leave it blank and continue with the installation.
Serial Number
< Back
Next >
Cancel

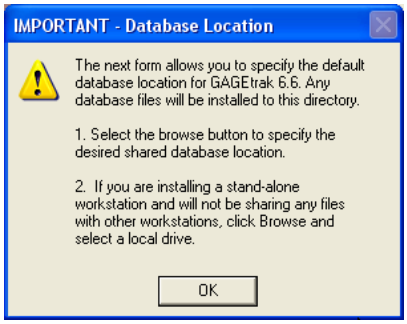
5. Now the installation program will tell you that you will be choosing the location for the program on your hard drive. Since this location is specific to each workstation, do not select a network location. We recommend using the default directory—C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5.

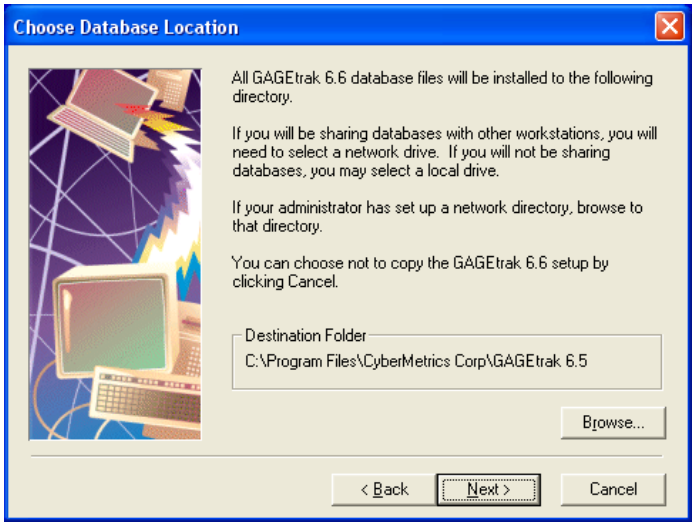

Program Location
The next form allows you to specify where the GAGEtrak 6.6 program will be installed. Do not specify a network location. It is recommended that you accept the default location C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5.
OK


Choose Program Location
Setup will install GAGEtrak 6.6 in the following folder.
To install into a different folder, click Browse, and select another folder.
You can choose not to install GAGEtrak 6.6 by clicking Cancel to exit Setup.
Destination Folder
C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5
Browse...
< Back
Next >
Cancel

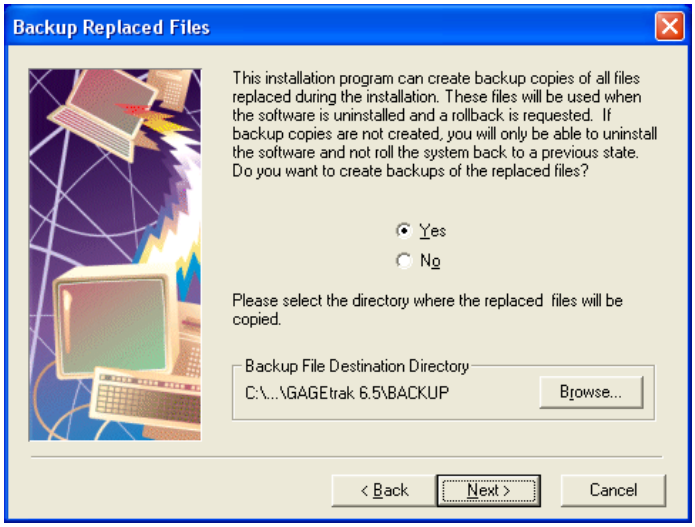
6. Unless you're using the program with an MS SQL database, the installation program will now let you select a location for the GAGEtrak database. If you are using GAGEtrak in a client/server environment, skip to step 9.
7. If you are using the program on a single workstation, select the default directory—C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5. If you have a network license of the program and are using it with an Access database, click the Browse button and select the network directory where you will store your database. If you are running the setup from a network drive, the path to the SETUP.EXE file will be the default database location.

8. If the folder you have selected has already been created, a message window will appear to confirm that you wish to install to that directory “anyway.” Click Yes to continue installation.

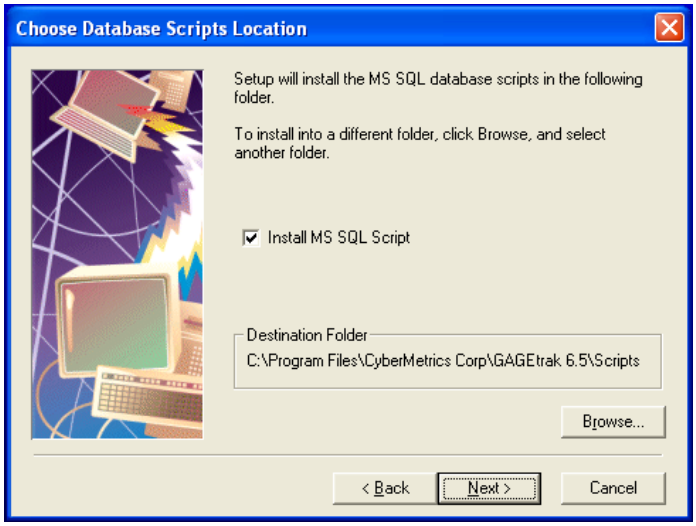

IMPORTANT - Database Location
The next form allows you to specify the default database location for GAGEtrak 6.6. Any database files will be installed to this directory.
1. Select the browse button to specify the desired shared database location.
2. If you are installing a stand-alone workstation and will not be sharing any files with other workstations, click Browse and select a local drive.
OK


Choose Database Location
All GAGEtrak 6.6 database files will be installed to the following directory.
If you will be sharing databases with other workstations, you will need to select a network drive. If you will not be sharing databases, you may select a local drive.
If your administrator has set up a network directory, browse to that directory.
You can choose not to copy the GAGEtrak 6.6 setup by clicking Cancel.
Destination Folder
C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5
Browse...
< Back
Next >
Cancel

9. Next, GAGEtrak will ask if you want it to create backup copies of all of the files that it overwrites on your system. We recommend that you select Yes and use the default location (C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5\BACKUP).

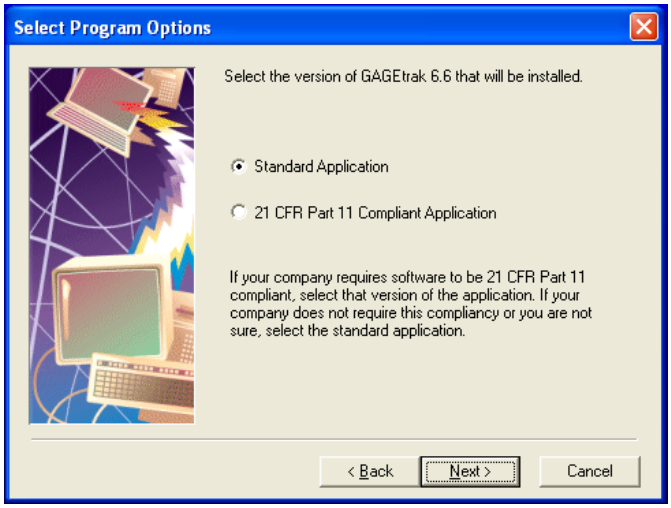

Backup Replaced Files
This installation program can create backup copies of all files replaced during the installation. These files will be used when the software is uninstalled and a rollback is requested. If backup copies are not created, you will only be able to uninstall the software and not roll the system back to a previous state. Do you want to create backups of the replaced files?
Yes
No
Please select the directory where the replaced files will be copied.
Backup File Destination Directory
C:\...\GAGEtrak 6.5\BACKUP
Browse...
< Back
Next >
Cancel

10. If you're using a SQL version of GAGEtrak, the installation program now asks where you want to install the database scripts. Click the Browse button to select a location. If you don't want to install the scripts, remove the check from the Install MS SQL Script box.

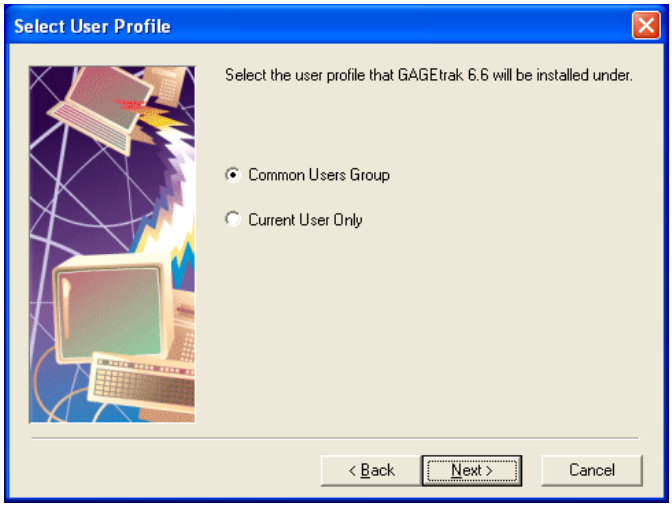

Choose Database Scripts Location
Setup will install the MS SQL database scripts in the following folder.
To install into a different folder, click Browse, and select another folder.
Install MS SQL Script
Destination Folder
C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5\Scripts
Browse...
< Back
Next >
Cancel

11. Select the version of GAGEtrak that will be installed.
    - If your company is not required to comply with 21 CFR Part 11, select the radio button labeled Standard Application. This is the default installation.
    - If your company is required to be compliant with 21 CFR Part 11, select the radio button labeled 21 CFR Part 11 Compliant Application.

- If you are not sure if you are required to comply or not, select the standard version of the program. Both versions are identical except that the compliant version requires security to be active at all times.

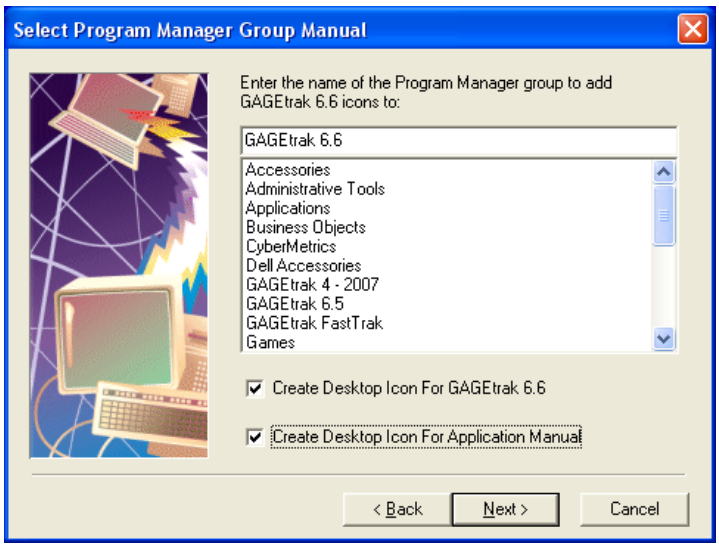

Select Program Options
Select the version of GAGEtrak 6.6 that will be installed.
Standard Application
21 CFR Part 11 Compliant Application
If your company requires software to be 21 CFR Part 11 compliant, select that version of the application. If your company does not require this compliancy or you are not sure, select the standard application.
< Back
Next >
Cancel

12. Select the user profile that GAGEtrak will be installed under.
    - If you want every user who logs in to the workstation to see the shortcut for the GAGEtrak application, select the radio button labeled Common Users Group. This is the default installation.
    - If you want only the current user to see the shortcut for the GAGEtrak application, select the radio button labeled Current User Only.

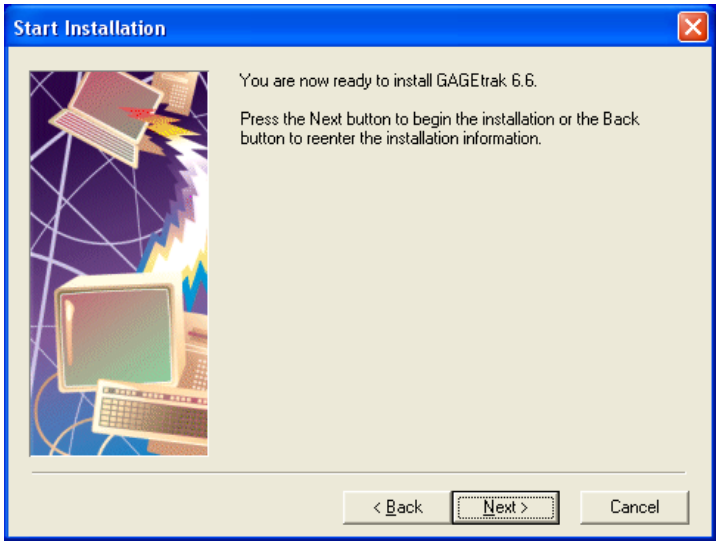

Select User Profile
Select the user profile that GAGEtrak 6.6 will be installed under.
Common Users Group
Current User Only
< Back
Next >
Cancel

13. Now the program will ask you to select the Programs group to add GAGEtrak's shortcuts to. You can also choose to put shortcuts for the application and

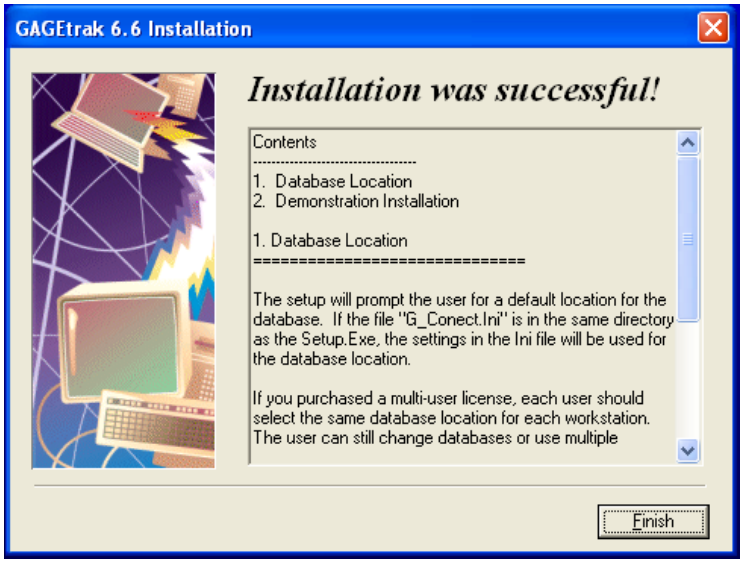
manual on the desktop. We recommend that you select the default: GAGEtrak 6.7.



14. Click Next, and this screen will appear:


Start Installation
You are now ready to install GAGEtrak 6.6.
Press the Next button to begin the installation or the Back button to reenter the installation information.
< Back
Next >
Cancel

15. Click Next to begin the installation. When it’s finished, you’ll see this screen:


GAGEtrak 6.6 Installation
Installation was successful!
Contents
1. Database Location
2. Demonstration Installation
1. Database Location
The setup will prompt the user for a default location for the database. If the file "G_Conect.Ini" is in the same directory as the Setup.Exe, the settings in the Ini file will be used for the database location.
If you purchased a multi-user license, each user should select the same database location for each workstation. The user can still change databases or use multiple
Finish

16. Click Finish. If additional files are required for GAGEtrak 6.7 to run, they will install now. Follow the instructions on your screen to install any additional files.

    Please note that Technical Support is not available for the creation of your client/server database.

After You Install GAGEtrak

If you're upgrading from a previous version of GAGEtrak, you will need to run the Data Transfer Utility before you begin using the program. Please see *Appendix A: Data Transfer Utility* for complete instructions. If you're using GAGEtrak in a client/server environment, first follow these steps to configure it with your MS SQL database:

Administrator Installation

To complete the administrator setup, follow these steps:

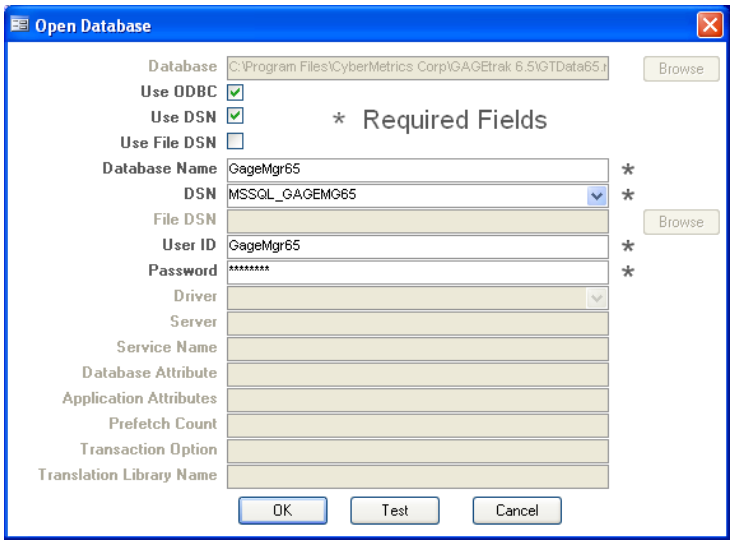
> **Note: You will need to do this only once for an administrator setup. To set up each workstation, follow steps 3-10.**

1. Run the appropriate scripts for your server to create the database and tables. The scripts are located in the GAGEtrak6.5\SCRIPTS directory. The files have prefixes to their names (Step1, Step2…) to indicate the order in which you should run them. You might need to modify the data file in the table space for your system. See the Step 1 script for details.

2. Next, run GAGEtrak's Data Transfer Utility Version 6 to import existing data from a previous version or prefill the database.
3. Open GAGEtrak 6.7 and select Open Database from the File menu.
4. In the Open Database screen, check the Use ODBC checkbox.
5. Place a check in the Use DSN checkbox.

   Important: If you used a different *Database Name*, *DSN*, *User ID*, and/or *Password* during installation, enter the information you used instead of the values listed below.

6. The Database Name should read `GageMg65` (or the name that you entered during installation).
7. The DSN field should show `MSSQL_GageMg65` (the DSN that you entered during installation; this value may be different).
8. Your user ID should be `GageMg65` (this field may also vary according to your setup).
9. The Password field should contain the password you entered during installation. Note that the password is displayed as asterisks for security purposes.
10. Your screen should look similar to the one below. When you're finished, click OK.



Configuration File Settings

If you want to reconfigure your G_CONECT.INI file, follow these guidelines:

Note: The brackets ({x}) contain instructions about the information you should enter after the equal sign (=) on each line.

[Database]

dbType=*{0 for a Microsoft Access Database, 1 for a client/server database}*

UseDSN=*{0 for No, 1 for Yes (used only for client/server)}*

UseFileDSN=*{0 for No, 1 for Yes (used only for client/server)}*

File=*{Name of the database file (used for Microsoft Access Database)}*

Path=*{Path (mapped drive or UNC) to the database file (used for Microsoft Access Database)}*

DSN=*{Data Source Name for the database (used for DSN)}*

FileDSN=*{Name and path (mapped drive or UNC) of the DSN file (used with FileDSN)}*

Driver=*{Driver name (only if not using FileDSN or DSN)}*

Server=*{Name of the server (used for Microsoft SQL Sever)}*

Database=*{Name of the database (used for client/server)}*

UID=*{User ID (used only for client/server)}*

PWD=*{Password (used only for client/server)}*

APA=*{Application Attributes (used only for client/server) (not required)}*

DBA=*{Database Attribute (used only for client/server) (not required)}*

PFC=*{Prefetch Count (used only for client/server) (not required)}*

TLL=*{Translation Library Name (used only for client/server) (not required)}*

TLO=*{Translation Option (used only for client/server) (not required)}*

[Install]

InstallCode=*{Installation Code—found on software package and CD envelope}*

Sample Configuration

The following sample is for a single-user, Access database version of GAGEtrak 6.7.

[Database]

dbType=*0*

UseDSN=

UseFileDSN=

File=*GTDATA65.MDB*

Path=*C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5*

DSN=

FileDSN=

```
Driver=
Server=
Database=
UID=
PWD=
APA=
DBA=
DBQ=
PFC=
TLL=
TLO=

[Install]
InstallCode=
```

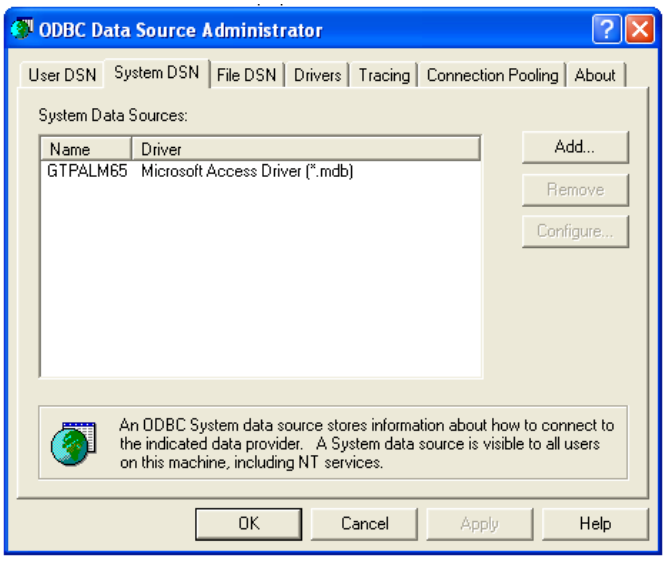
Chapter 2: MS SQL Installation

If you're going to use GAGEtrak on an MS SQL client/server system, first install GAGEtrak (see chapter 1 for instructions), then create the data source name (DSN) for your setup, following the instructions in this chapter.

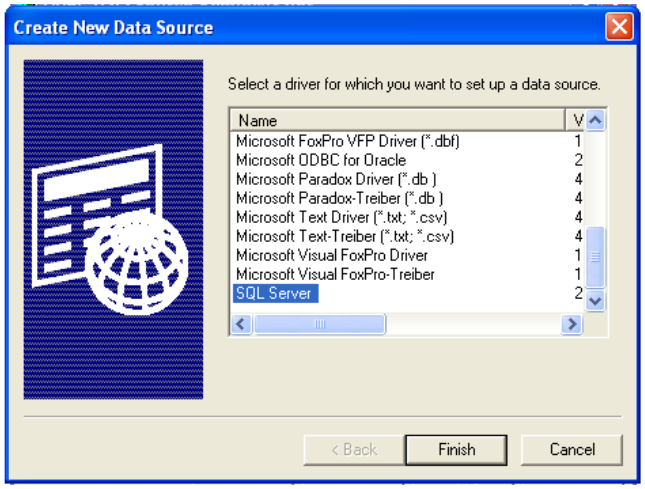
Create Data Source Name (DSN) for MS SQL

If you're using GAGEtrak with an MS SQL server, follow these steps to create your DSN.

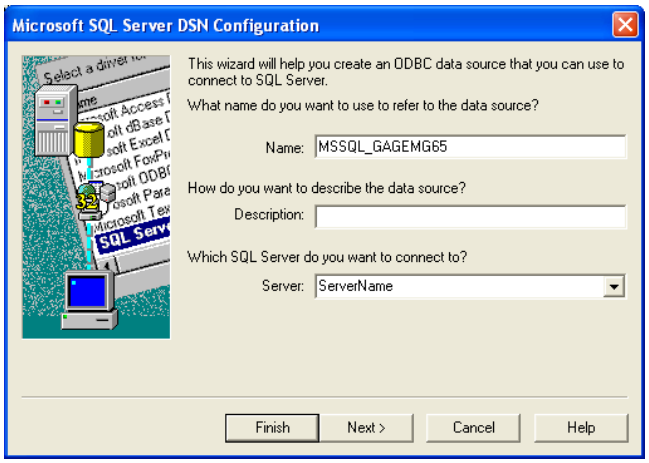
1. Click Start, then select Settings | Control Panel | Administrative Tools. Double-click the Data Sources (ODBC) icon, and the ODBC Data Source Administrator window will appear.
2. Go to the System DSN tab.



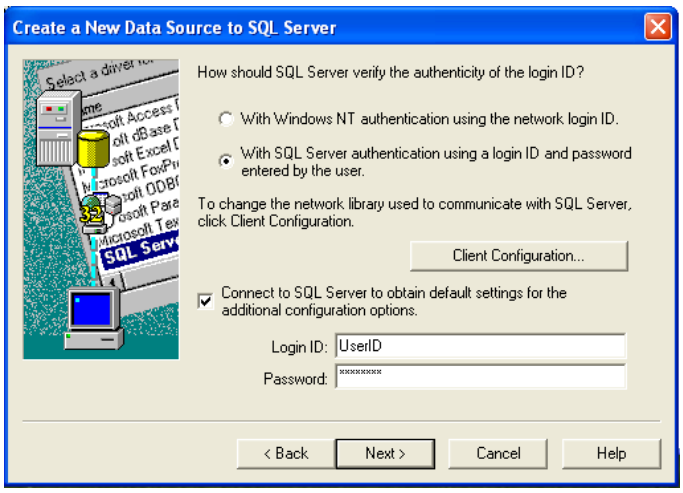
3. Click the Add button. You'll see a screen similar to this one:



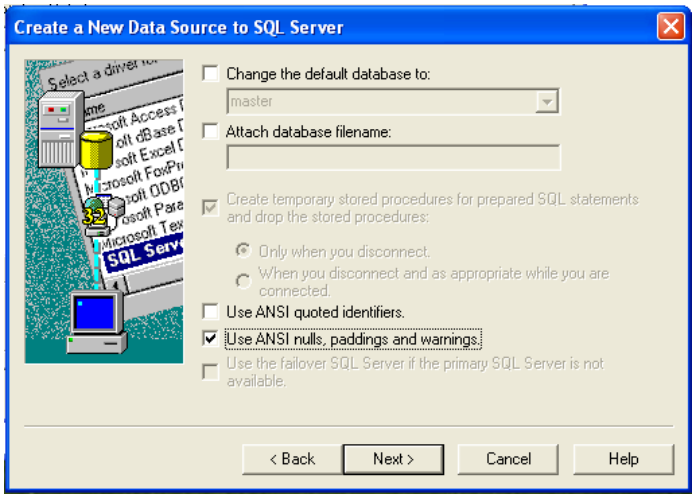
4. Select the `SQL Server ODBC driver` and click Finish. This screen will appear:


Microsoft SQL Server DSN Configuration
This wizard will help you create an ODBC data source that you can use to connect to SQL Server.
What name do you want to use to refer to the data source?
Name:
MSSQL_GAGEMG65
How do you want to describe the data source?
Description:
Which SQL Server do you want to connect to?
Server:
ServerName
Finish
Next >
Cancel
Help

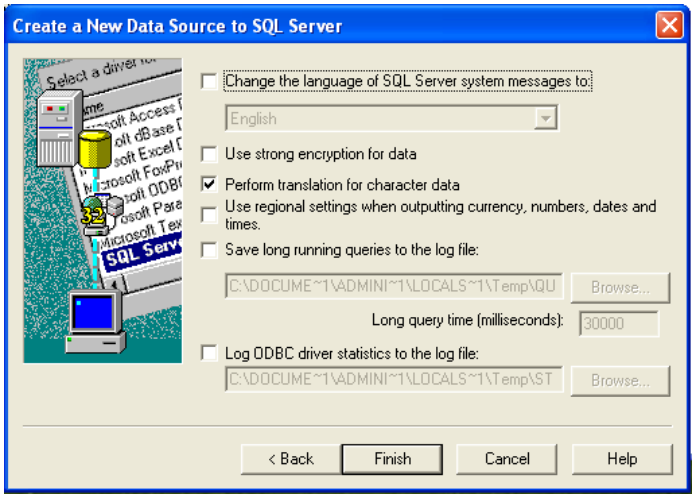
5. Enter `MSSQL_GAGEMG65` for the data source Name.
6. In the Description field, enter a brief explanation about the data source.
7. After you enter the name of the MS SQL server, click Next. This screen will appear:


Create a New Data Source to SQL Server
How should SQL Server verify the authenticity of the login ID?
With Windows NT authentication using the network login ID.
With SQL Server authentication using a login ID and password entered by the user.
To change the network library used to communicate with SQL Server, click Client Configuration.
Client Configuration...
Connect to SQL Server to obtain default settings for the additional configuration options.
Login ID:
UserID
Password:
< Back
Next >
Cancel
Help

8. Enter the Login ID and Password for your SQL server, and then click Next.
9. You'll see the Configuration screen. If needed, change the default database (check the box next to this field and enter or select a new database).


Create a New Data Source to SQL Server
Change the default database to:
master
Attach database filename:
Create temporary stored procedures for prepared SQL statements and drop the stored procedures:
Only when you disconnect.
When you disconnect and as appropriate while you are connected.
Use ANSI quoted identifiers.
Use ANSI nulls, paddings and warnings.
Use the failover SQL Server if the primary SQL Server is not available.
< Back
Next >
Cancel
Help

10. Now, click the Next button. You should see a screen similar to this one:

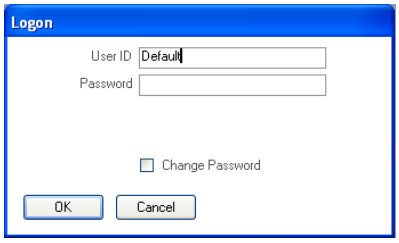


11. Click Finish. The SQL Server Setup screen will appear.
12. To check the data source, click Test Data Source. If you don’t want to test it, click OK.
13. When you’re finished, close the ODBC Data Source Administrator.

Chapter 3: Running GAGEtrak

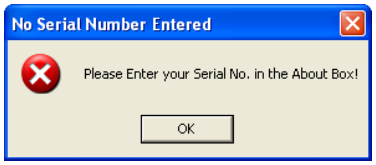
Logon

When you open GAGEtrak, a logon window will appear, if you have set up security. Enter your User ID and Password and click OK.

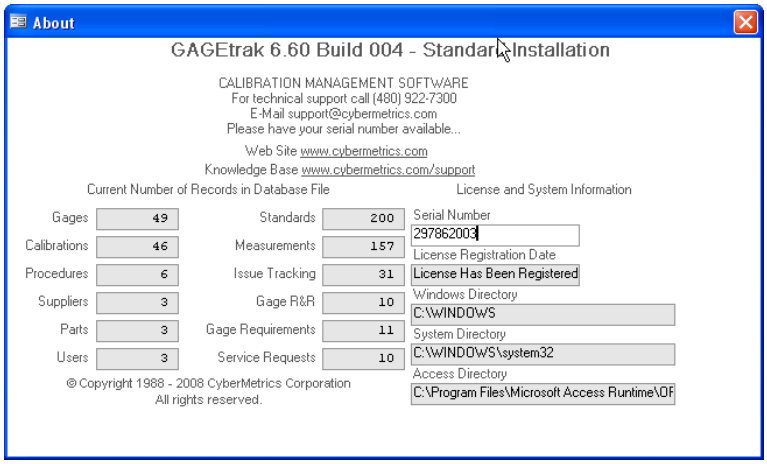


Serial Number

If you haven't entered your program serial number into the About box, the following message will appear to remind you to enter it.

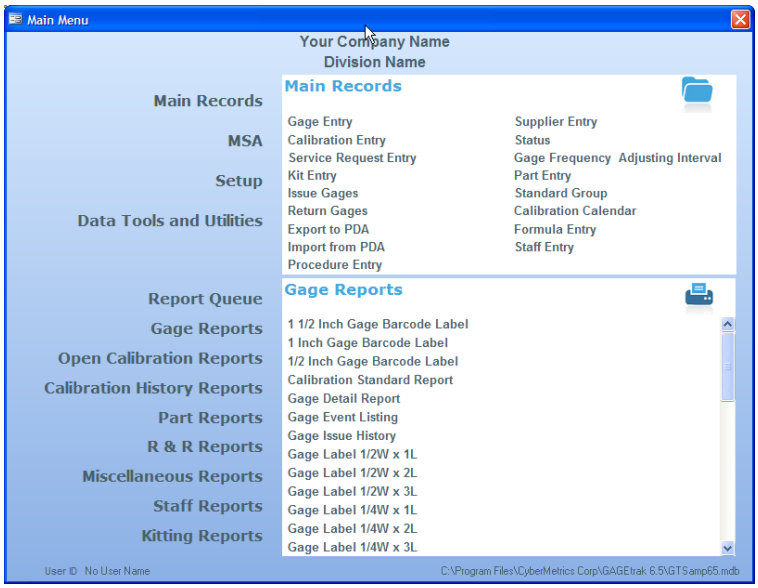


Click OK, and the About window will appear. Enter your GAGEtrak serial number (located on your registration card and on the packing list that came with your package). If you can't find your serial number, contact Technical Support at **(480) 922-7300.**

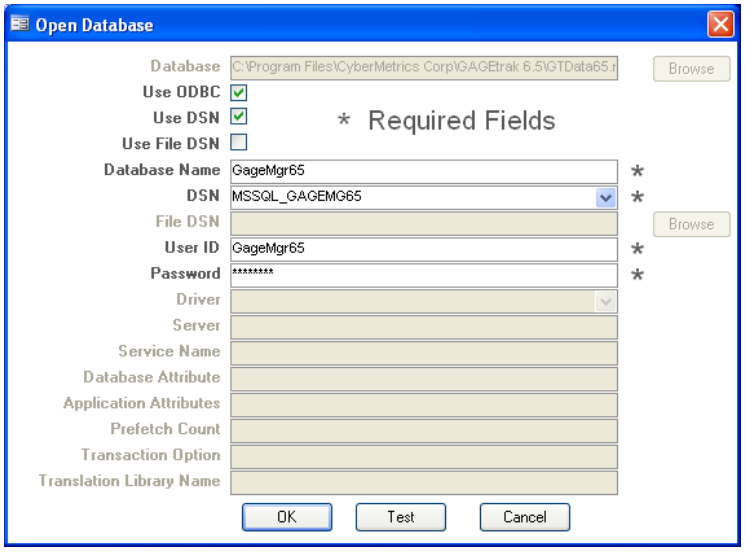


Main Menu

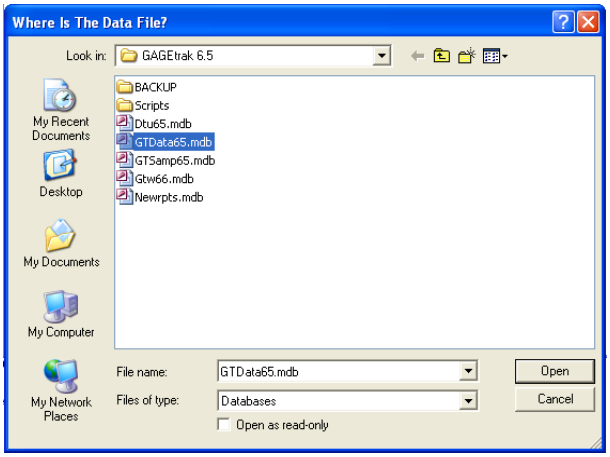
The main menu shows the name of the currently logged-in user in the lower left corner and shows the full path to current database file in the lower right corner.



If the program can't find your database file, then the Open Database window will appear. If this happens, you'll need to tell GAGEtrak where to find the database file "GTDATA65.MDB." The Open Database window looks like the one shown here:



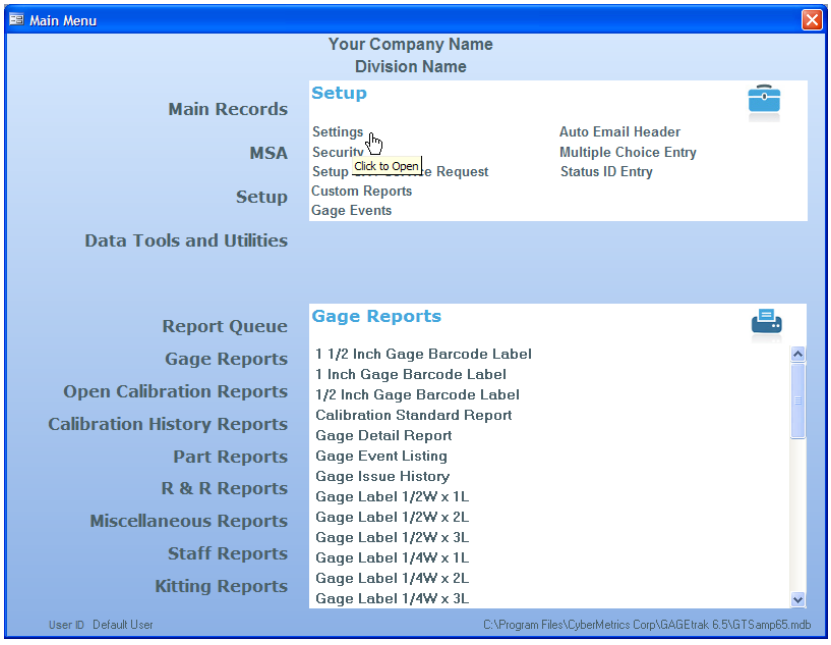
If this window appears, click the Browse button and navigate through the available drives and directories until you find the database file. Remember that the file name must be "GTDATA65.MDB."



Note: Users who have their database file located on the network server must log in to the network operating system before they can open the database file. If you're using GAGEtrak on a client/server system, you must set up the Open Database screen according to your database configuration.

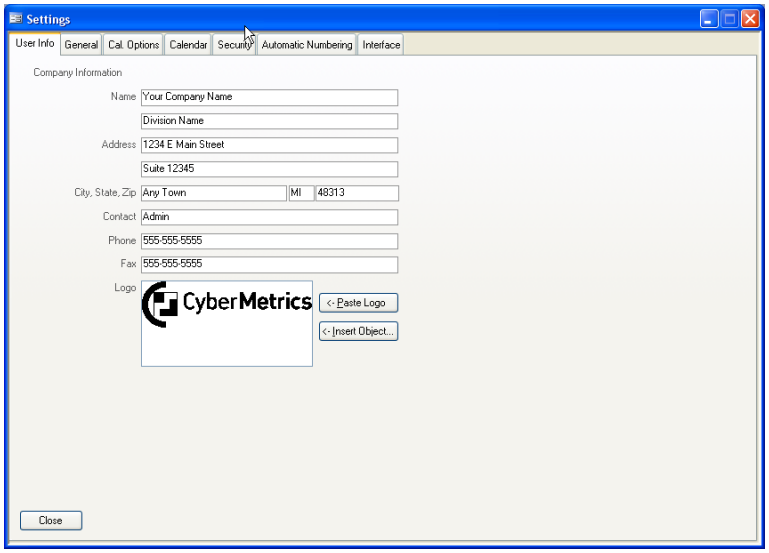
Chapter 4: Setting Up GAGEtrak

Before you begin entering records, we recommend that you configure your GAGEtrak program. To do so, go to the Setup menu and select Settings.



Settings—User Information

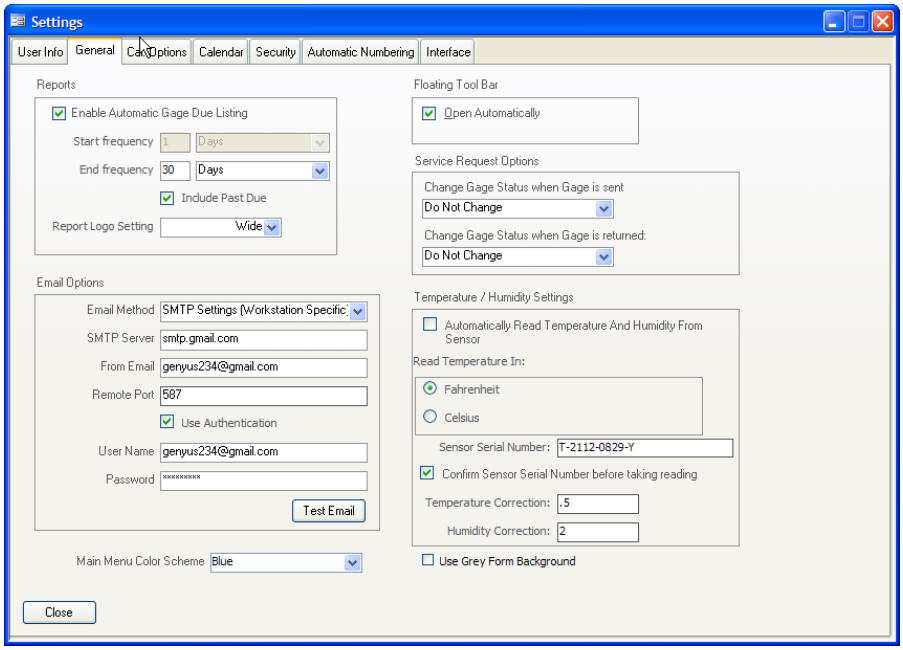
In the first Settings screen, User Info, enter your company information.



The table below describes the fields on this form:

Field/Button Name	Description
Company Information	Enter your company name, address, contact, phone/fax numbers, and logo (optional). The two lines for your company name and logo will appear at the top of all reports.
Paste Logo and Insert Object	To enter your company logo, use the Insert Object or Paste buttons. Use Insert Object if you already have a logo file or want to create the logo in a graphics program and link it to GAGEtrak. Use the Paste button if you've copied the logo to **Windows Clipboard**. Try to insert a logo graphic about the same size as the logo region shown that would fit into a square or rectangular area. If the logo would fit best into a rectangle, check the Use Wide Logo Field checkbox, as shown above. To avoid wasting memory, don't use a logo with more colors than your printer can print. You can use a scanner to obtain your logo, but scanners are often set for more resolution or colors than your printer can support. A logo created this way becomes a huge file that uses an excessive amount of memory. To conserve memory, paste your logo into GAGEtrak as a .BMP file, even if you created it in a graphics program. Pasting your logo as a bitmap image uses less memory. If you can view your logo in the Settings window, but it doesn't appear on your reports, you don't have enough memory for the logo size (in bytes) that you've used. **Tip: Generation of reports that contain a company logo will generate more efficiently if the logo size is within the 1KB range.**
Cancel	Click Cancel to return to the main menu without saving your changes.
Close	To save your changes and return to the main menu, click the Close button.

Settings—General

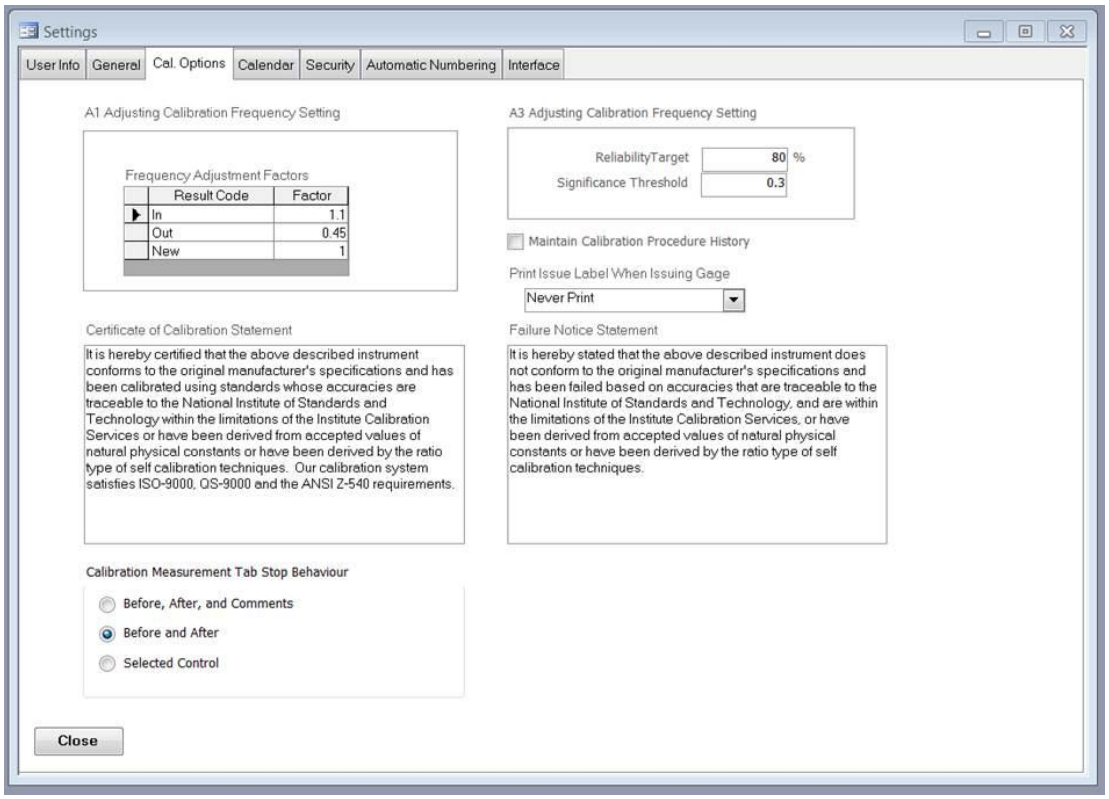


The table below describes the fields on this form:

Field/Button Name	Description
Enable Automatic Gage Due Listing Report	Check this box if you want the **Calibration Due Listing by Due Date Report** to automatically pop up when you initiate GAGEtrak. This report shows gage IDs that are due or past due. You can print the report or close it to continue into the program. A message will appear if you don't have any gages due for calibration.
Start Frequency	This field sets the start date of the Automatic Gage Due Listing Report. The start day will be calculated to before the current date using this frequency. So, if this frequency is 7 days and the current date is 10/8/2008, then the start date will be 10/1/2008. Usually this will be 0 Days, since you want to show all the calibrations due starting from today.
End Frequency	This field sets the end date of the Automatic Gage Due Listing Report. If you want to know what calibrations are due for the next month, select 1 Month.
Include Past Due	Check this box if you want to show calibrations that are past due. This will show every calibration due till the end frequency.
Report Logo Setting	Affects how the logo will be displayed on reports: • Normal – 1,440 x 1, 440 twips (1" x 1") • Wide – 2,880 x 1,440 twips (2" x 1"} • Custom – user defined A twip is 1/20 of a printer's point; 1,440 twips equal one inch, and 567 twips equal one centimeter. These measurements designate the size an object will be when printed. Actual physical distances on the screen vary according to your monitor's size and resolution.
Email Method	Email transmission setup: • Email Method – select protocol for sending email between servers. • SMTP Server – insert name of server. • From Email – insert your email address • Remote Port – check with your System Administrator for an acceptable port number. • User Authentication-is the process of identifying an individual, usually based on a User Name and Password. o Test Email – performs validity of information entered in email setup.
Floating Toolbar	In the data entry screens, you can click the floating toolbar to resize or move it. If you don't want the toolbar to be visible, un-check the Open Automatically checkbox within the Floating Toolbar Frame. Please see the *Program Conventions* section of the *User's Manual* for more information on the toolbar.
Change Gage Status when Gage is sent	When a gage is attached to a Service Request, the application can automatically change that gage's Status ID based on the Type selection for the Service Request. Choose Do Not Change to prevent such changes , Automatically Change to have the change made without user intervention, and Ask To Change to ask the user if such a change should be made.
Change Gage Status when Gage is Returned	When a gage attached to a Service Request has been returned from the Service Supplier and its Gage Service Request Status is set to Closed, the application can set the status of that gage back to Active. This change will also be done if the Status for the entire Service Request is set to Closed.

Field/Button Name	Description
Automatically Read Temperature and Humidity From Sensor	The application has the ability to read ambient temperature and humidity from a variety of USB sensors and place that information in a Calibration record. Check this box to have the application automatically read these values when a Calibration record is Approved. The user can also manually read these values from the sensor by double-clicking in the appropriate field in Calibration Entry.
Read Temperature In:	Use this option to tell the application if the temperature reading for the USB sensor will be read in degrees Celsius or degrees Fahrenheit. This setting applies to the automatic and manual temperature readings.
Main Menu Color Scheme:	Use this option to select one of the defined color schemes for the Main Menu. You will see the new color scheme when you close the Settings form.
Use Grey Form Background	GAGEtrak uses the Windows Theme settings for forms and buttons. This controls the look of the forms as well as the colors used in forms. To turn off Windows Theme and use the older, grey form, check this checkbox. This setting will not take effect until you close and reopen the GAGEtrak application.
Cancel	Click the Cancel button to discard any changes and exit this window.
Close	To save your changes and return to the main menu, click the Close button.

Settings—Cal. Options


Settings
User Info
General
Cal. Options
Calendar
Security
Automatic Numbering
Interface
A1 Adjusting Calibration Frequency Setting
Frequency Adjustment Factors
Result Code
Factor
In
1.1
Out
0.45
New
1
A3 Adjusting Calibration Frequency Setting
ReliabilityTarget
80 %
Significance Threshold
0.3
Maintain Calibration Procedure History
Print Issue Label When Issuing Gage
Never Print
Certificate of Calibration Statement
It is hereby certified that the above described instrument conforms to the original manufacturer's specifications and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limitations of the Institute Calibration Services or have been derived from accepted values of natural physical constants or have been derived by the ratio type of self calibration techniques. Our calibration system satisfies ISO-9000, QS-9000 and the ANSI Z-540 requirements.
Failure Notice Statement
It is hereby stated that the above described instrument does not conform to the original manufacturer's specifications and has been failed based on accuracies that are traceable to the National Institute of Standards and Technology, and are within the limitations of the Institute Calibration Services, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of self calibration techniques.
Calibration Measurement Tab Stop Behaviour
Before, After, and Comments
Before and After
Selected Control
Close

The table below describes the fields on this form:

Field/Button Name	Description
A1 Adjusting Calibration Frequency Setting	Method A1 usually changes the calibration frequency every time you calibrate, even after the calibration frequency has achieved high end-of-period reliability. Most users will prefer less frequent changes, and may not want the short calibration intervals that go with high reliability. Method A1 is included for users who are familiar with it, and wish to continue using it. If you check the *Auto Adjust Cal Frequency* box (in **Gage Entry**) for any gage, whenever you enter a new calibration record for it, GAGEtrak automatically adjusts its calibration frequency according to the rules you define in the *Frequency Adjustment Factors* table. This table is preset to use the NCSL RP-1 Method A1 (see Appendix B of the *User's Manual* for NCSL's address). This method increases the existing calibration frequency by 10% if the as found condition of the gage is in tolerance (multiplied by 1.1). If the as found condition of the gage is out of tolerance, then it reduces the interval by 55% of the existing frequency (multiplied by .45). If the gage is new and you've never calibrated it, then the interval remains the same (multiplied by 1). Simulation studies show that you achieve measurement reliability target of 95% EOP using this approach. "EOP" stands for "End Of Period"—it refers to the reliability of a gage at the end of its calibration interval. You can change the table to use different factors if you need to use another frequency adjustment method. **Example: If the frequency is 30 days, and the as found condition before calibration is *in* tolerance, then the frequency would be set to 33 days (1.1 x 30 = 33 days). If the as found condition was *out* of tolerance, the frequency would be automatically reduced to 13.5 days (.45 x 30 = 13.5 days).**
A3 Adjusting Calibration Frequency Setting	Method A3 lets you specify a Reliability Target, and requires a certain amount of statistical Confidence before deciding that a change is necessary. Method A3 tends to eliminate unnecessary changes. When a change is found to be necessary, method A3 uses formulas that optimize the Calibration Frequency in fewer steps than Method A1. Method A3's recommendation is available even for gages that do not have Auto Adjust Calibration Frequency turned on. To see these recommendations click on Gage Frequency Adjusting Interval in Main Records.
Reliability Target	This is the desired end-of-period reliability, for example: the desired probability that the as-found condition of the gage will be "in tolerance" at the end of the calibration period (after the optimum calibration frequency has been achieved). GAGEtrak will recommend changes to the calibration frequency until the specified reliability is obtained. The default Reliability Target is 80%, but you can change it. Specifying higher reliability will result in more frequent calibration.
Significance Threshold	This is the maximum amount of risk GAGEtrak will take in recommending a change. i.e., the risk that a recommended change will turn out not to have been necessary. The default is 0.3. Specifying lower significance will increase the number of calibrations required to make a decision. Significance must be between 0 (never change) and 1 (always change).
Maintain Calibration Procedure History	Checking this will enable Procedure History to be recorded. In a Standard installation, this will be unchecked by default. For a 21 CFR install, this will be checked and locked.
Print Issue Label When Issuing Gage	Default print label selection for label issuance.

Field/Button Name	Description
Certificate of Calibration Statement	This statement is included in the **Certificate of Calibration** document (see the Reports section of the *User's Manual*). This field scrolls up and down to allow for longer statements.
Failure Notice Statement	This statement is included in the Calibration Failure Notice document. This field scrolls up and down to allow for longer statements.
Cancel	Click the *Cancel* button to discard any changes and exit this window.
Close	To save your changes and return to the main menu, click the Close button.

Calibration Measurement Tab Stop Behavior

( ) Before, After, and Comments

[Tab] key or [Enter] key goes to each of these three fields for each measurement.

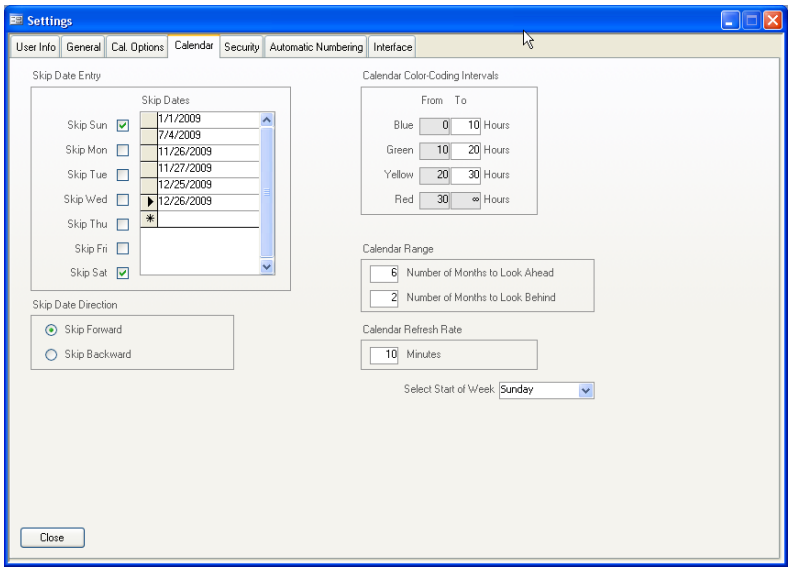
( ) Before and After

[Tab] key or [Enter] key goes to **Before** and **After** fields for each measurement.

( ) Selected Control

[Tab] key or [Enter] key goes to one field of your choice in the **Calibration Measurements** window. To use this option when you are calibrating a gage, place your cursor in the field of your choice, for example, **Before**. The [Tab] key or [Enter] key will go to the **Before** field for the next measurement. If, instead, you place your cursor into the **After** field, the [Tab] key or [Enter] key will go to the **After** field for the next measurement. This option is useful when only one measurement for the standard is required. Some tools or items are adjustable and can be calibrated to a different measurement; these tools would have different **Before** and **After** measurements.

Settings—Calendar



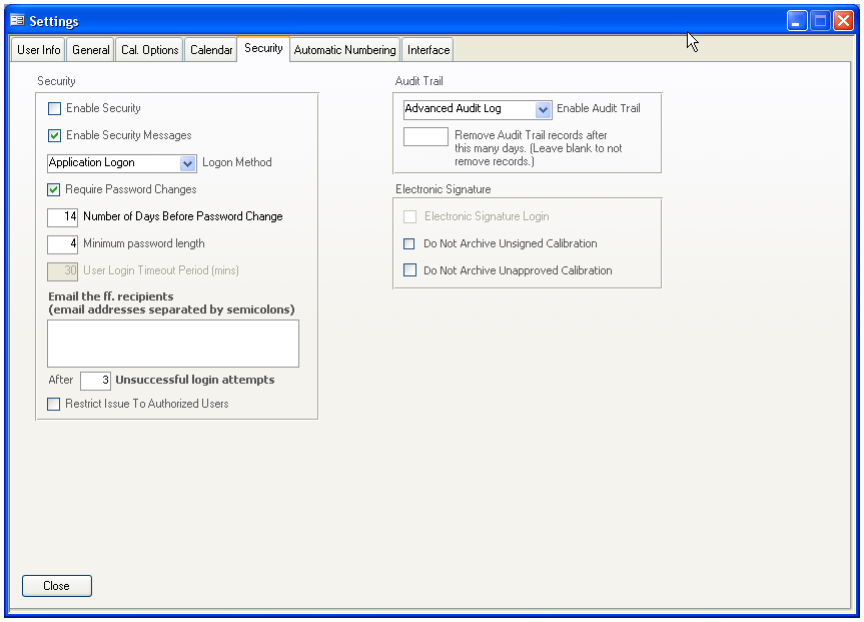
The table below describes the fields on this form:

Field/Button Name	Description
Skip Date Entry / Skip Date Direction	GAGEtrak lets you define dates that you want skipped when it calculates calibration due dates. These days, called skip dates or skip days, might include holidays, vacation periods, or plant shutdown periods. Enter as many skip dates as necessary. To delete a skip date, click on the record selector box (on the left of each date) and press *DELETE*. To skip days of the week (like weekends), check the box next to each day you want to skip. If a *calculated* calibration due date falls on a skip date, GAGEtrak schedules it on the following day, or the previous day, depending on the Skip Forward and Skip Backward set for each gage. Select Skip Forward or Skip Backward in this window to set the default. If you *manually* enter a calibration due date, GAGEtrak won't apply your skip dates to it.
Calendar Color-Coding Intervals	Four different colors are used to display the number of hours shown on the Calibration Calendar. You can set the number of hours for each color according to the staffing level available on a daily basis. The colors on the calendar will show at a glance which days are over- or understaffed.
Calendar Range	Use these fields to set the number of months to look ahead of or behind the current month. If you want to put large numbers here, experiment with them. The larger the number of months, the longer it will take to calculate next due dates and generate the Calibration Calendar. For faster operation, you may want to set the Calendar Range from 1 to 3 months ahead and behind.
Calendar Refresh Rate	Use this field to modify the interval at which GAGEtrak automatically updates the calibration data shown in the calibration schedule calendar. Refreshing the calendar ensures that the data shown in the calendar accurately reflects the data in the database; you may wish to modify the refresh rate according to how busy your calibration lab is.
Select Start of Week	The day of week selected will dictate how the calendar is presented to the user, for example select Monday as the start of the week, and then double click in a date field. You'll notice the day of the week begins with Monday and ends with Sunday in the Choose a Date popup calendar.

Settings—Security

The Security tab contains controls for the security features of GAGEtrak. Security parameters are set in the Security section of the Setup menu. For more information, see Setup—Security.

The 21 CFR Part 11 Compliant version of GAGEtrak permanently enables its security, advanced audit trail, and electronic signature features. Therefore, if you have installed the 21 CFR Part 11 Compliant version of GAGEtrak, the Enable Security, Audit Trail, and Electronic Signature fields show at all times that these options are active. These fields are grayed out and cannot be changed.



The table below describes the fields on this form:

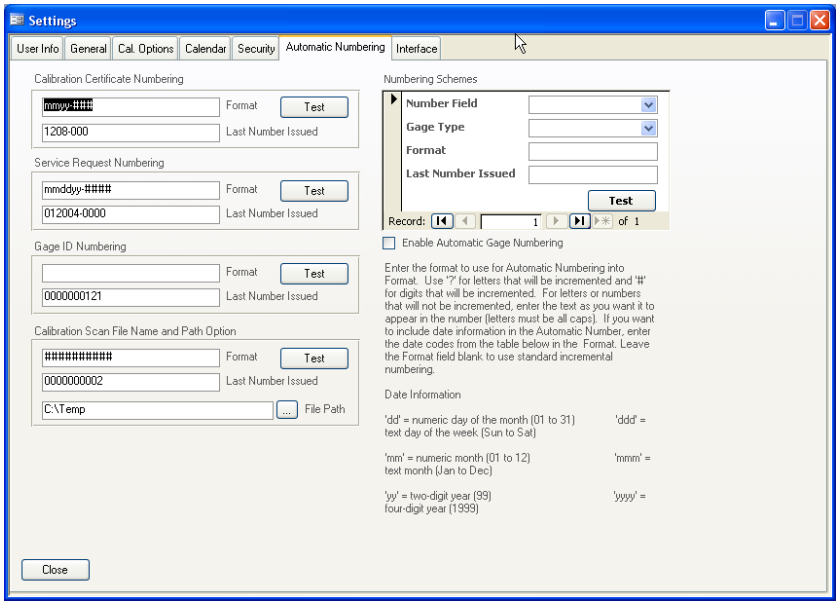
Field/Button Name	Description
Enable Security	Check this box if you want to use system security with GAGEtrak. If you have installed the 21 CFR Part 11 compliant version of GAGEtrak, security is automatically permanently enabled; this option is grayed out to show that you cannot change it. If Enable Security is checked under a Standard Installation of the application, you will be required to create at least one Admin user prior to enabling this feature. You can create user security groups and assign group permissions in the Security utility.
Enable Security Messages	If you check this box, GAGEtrak will display warning messages if users try to perform actions, such as deleting records, they don't have permission deleting. If you leave this box unchecked, users won't see messages, but will still be unable to do anything they don't have permission to do.

Field/Button Name	Description
Logon Method	GAGEtrak allows you to choose from two types of system security: ▪ Windows Logon–uses security from your Windows operating system; when users login to Windows, they can access GAGEtrak ▪ Application Logon–uses security specific to the GAGEtrak program; you must set up user IDs and passwords in Security.
Require Password Changes	Check this checkbox to require users to change their logon passwords at intervals chosen by the administrator. When this option is selected, you may select any Number of Days Before Password Change. The default interval is 14 days.
Minimum Password Length	Enter the minimum number of characters GAGEtrak will allow for user-defined passwords.
User Login Timeout Period	Enter the number of minutes of inactivity GAGEtrak will allow before automatically logging out a user. This feature is only available if Enable Security is activated. **Note: When the time period is changed you will have to restart the program before the change in duration of inactivity period will take effect. When the time has been exceeded and there has been no activity in the current session, the user will be prompted to log back into the application. For a 21 CFR installation only a non-zero whole number can be entered for the User Login Timeout Period. For a Standard Installation a zero value can be entered to disable the login prompt, but still maintaining security.**
Email the ff. recipients…	Enter a list of e-mail addresses, separated by semicolons that will receive an automatic e-mail notification based on the number set in Unsuccessful Login Attempts has been exceeded.
Restrict Issue To Authorized Users	If the Restricted Issue To Authorized Users checkbox is checked the application will control the persons authorized to Issue gages. If in Gage Entry | Auth. Persons | Restrict Issue is blank or if Program Default is selected the application will check whether or not Restrict Issue to Authorized User is checked in Settings (installation default for this feature is unchecked) – if it is the Issued To field in Issue Gages will list only the authorized users that were entered on the Gage Entry | Auth. Persons for that gage. If Restrict Issue to Authorized is not checked, all staff will be listed in the Issue To in Issue Gages form.
Enable Audit Trail	If you want to record actions users perform in the program, such as record modifications and deletions, make a selection from the *Enable Audit Trail* list box. The Basic Audit Trail lists basic user and action information. The Advanced Audit Trail lists basic user, action and Old and New Value information. To view the Audit Logging, select Audit Log from the Data Tools menu. The Advance Audit Trail is automatically permanently enabled if you have installed the 21 CFR Part 11 compliant version of GAGEtrak. This is not an editable option.
Remove Audit Trail Records...	Enter how many days' worth of audit trail records you want to keep. GAGEtrak will automatically purge and delete actions older than this value. For example, enter 7 to keep a week's worth of Audit Trail data. Enter 0 if you want to keep a comprehensive audit trail record. If you have installed the 21 CFR Part 11 compliant version of GAGEtrak, all audit trail records are retained permanently; in this case this option is grayed out to show that you cannot change it.

Field/Button Name	Description
Electronic Signature Login	Check this box to require users to login before signing any record. If you have installed the 21 CFR Part 11 compliant version of GAGEtrak, electronic signatures are automatically permanently enabled; this option is grayed out to show that you cannot change it.
Do Not Archive Unsigned or Unapproved Calibration	The selection of these options dictates how calibrations are to be archived: If the Do Not Archive Unsigned Calibration checkbox is NOT checked, then the Do Not Archive Unapproved Calibration checkbox should be unchecked. You can however just archive Unsigned Calibrations. Likewise, if the Do Not Archive Unapproved Calibration checkbox is checked, the Do Not Archive Unsigned Calibration checkbox should be checked – an approved calibration can only be archived if the Calibrated By and Approved By Signatures have been created for that calibration entry.

Settings—Automatic Numbering

GAGEtrak automatically generates a number sequence for your Calibration Certificates, Service Requests, Gage ID, Calibration Scan File Name and Path Option numbering, and Gage Numbering Schemes for cloning records. Use this screen to set the desired format.


Settings
User Info
General
Cal. Options
Calendar
Security
Automatic Numbering
Interface
Calibration Certificate Numbering
mmyy-####
Format
Test
1208-000
Last Number Issued
Service Request Numbering
mmddyy-####
Format
Test
012004-0000
Last Number Issued
Gage ID Numbering
Format
Test
0000000121
Last Number Issued
Calibration Scan File Name and Path Option
##########
Format
Test
0000000002
Last Number Issued
C:\Temp
File Path
Numbering Schemes
Number Field
Gage Type
Format
Last Number Issued
Test
Record:
1
of 1
Enable Automatic Gage Numbering
Enter the format to use for Automatic Numbering into Format. Use '?' for letters that will be incremented and '#' for digits that will be incremented. For letters or numbers that will not be incremented, enter the text as you want it to appear in the number (letters must be all caps). If you want to include date information in the Automatic Number, enter the date codes from the table below in the Format. Leave the Format field blank to use standard incremental numbering.
Date Information
'dd' = numeric day of the month (01 to 31)
'ddd' = text day of the week (Sun to Sat)
'mm' = numeric month (01 to 12)
'mmm' = text month (Jan to Dec)
'yy' = two-digit year (99)
'yyyy' = four-digit year (1999)
Close

The table below describes the fields on this form:

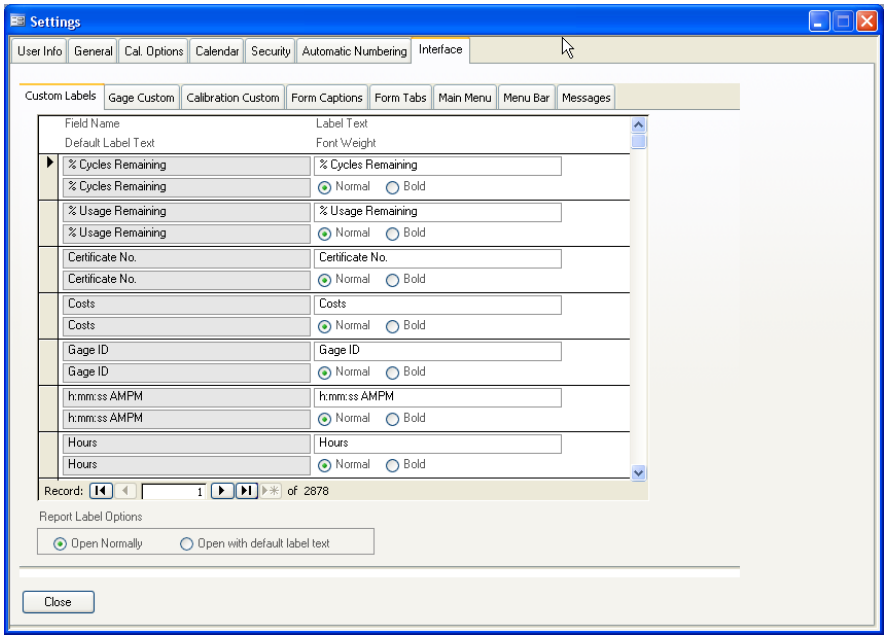
Field/Button Name	Description
Format	The format that will be used to create numbers for new records. Use '?' for incremented letters; '#' for incremented digits; enter text in all capitals. Leave field blank to use the default.
Last Number Issued	This field contains the last number issued. You can modify this number but be sure you enter the values correctly or there may be duplicates.
Test	Select this button to view next formatted number of the sequence.
File Path	Select the drill down button to the right of the file path field to access the Browse For Folder dialog box to select location for stored files.

Field/Button Name	Description
Numbering Schemes	Allows for custom numbering conventions for Number Fields and Request Types. If the numbering format does not fall within the numbering convention in Numbering Schemes it will default to the format defined in Settings | Automatic Numbering. The Number Fields and the Calibration Type dropdown lists contain predefined lists of fields that can be affected by the defined criteria in the Numbering Schemes section.
Enable Automatic Gage Numbering	If this checkbox were checked, then the automatic numbering of new gage records would proceed exactly as it does in the current build. If the checkbox were unchecked, then all automatic numbering of new gages would be disabled. This would include gage numbering by the gage type and the basic gage numbering as defined to the left of this form. Typical functionality for Calibration Certificate and Service Request Numbering.
Cancel	To exit this screen without saving your changes, click the Cancel button.
Close	If you want to save your changes, click Close to return to the main menu.

GAGEtrak provides a way to customize the appearance of the user interface of forms, labels, tabs, and much more. Listed below are descriptions and options available to users for customization:

Settings—Custom Label

This screen lets you modify the text labels of the fields you can use in the GAGEtrak 6.7 program.



The table below describes the fields on this form:

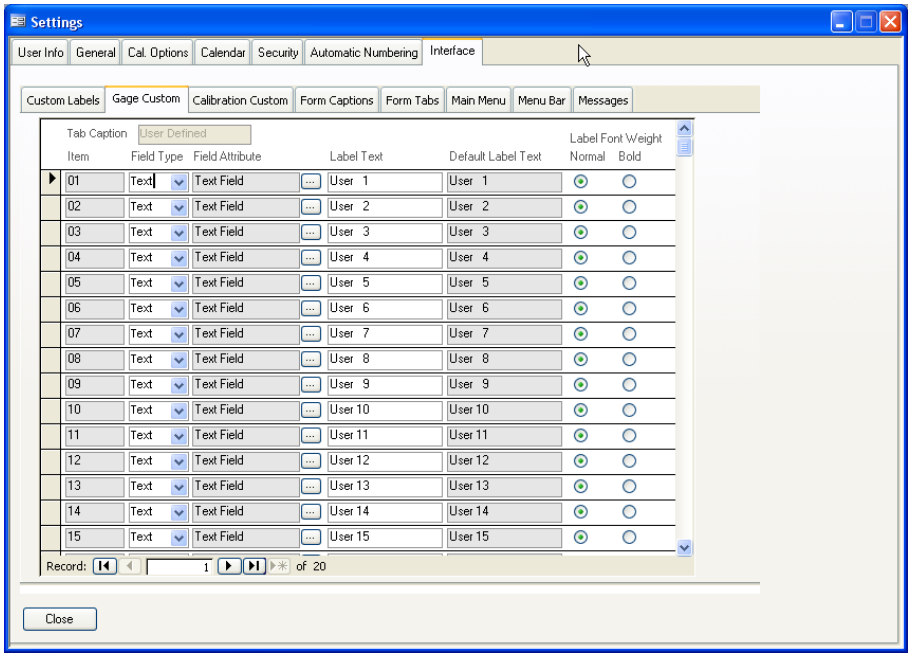
Field/Button Name	Description
Field Name	Default text used to describe the field in GAGEtrak.

Field/Button Name	Description
Label Text	Text that goes in the function field.
Default Label Text	If a field is to have a value at all time this is the value that the system will default to.
Normal or Bold	The weight appearance of the font.
Report Label Options	Select Open Normally to show the user-defined label text and use Open with default label text to show the default label text.
Cancel	To exit this screen without saving your changes, click the Cancel button.
Close	If you want to save your changes, click Close to return to the main menu.

The field names are in alphabetical order. Scroll down the list to find the field name you want to change. If, for example, you wanted to change Model No. to Tool No., in the Label Text area you would replace Model No. with Tool No. Once you change a field name here, it will be changed on all entry screens, filters, and reports.

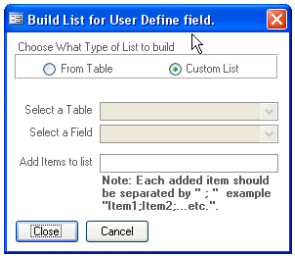
Settings—Gage / Calibration Custom

Gage Custom is the same as Gage Entry | User Interface, it's your preference as to what method you'd like to use in customizing the label text. Although, modifying the labels through this screen provides formatting options that can be applied to the labels.



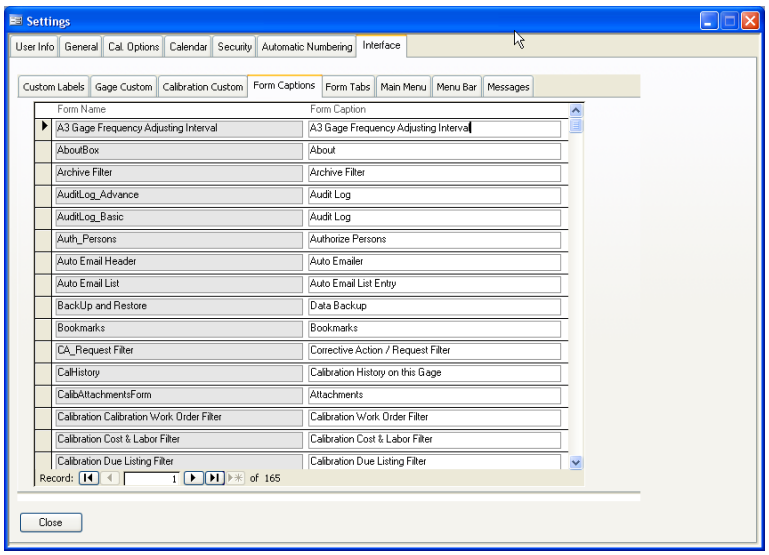
The table below describes the fields on this form:

Field/Button Name	Description
Tab Caption	In Gage Entry the tab currently titled User Defined can be edited to reflect a client specific title, for example Characteristics.

Field/Button Name	Description
Item	Item number that corresponds with the User 1-20 label.
Data Type	The default Data Type for Gage Custom labels is Text. Additionally the field information for the fields can be changed to accept a date value or can be changed to a list box generated From Table or Custom List input. The following form will appear when List is selected from Data Type: 
Field Attribute	Select the drilldown button to the right of the Field Attribute field so that the application updates the field based on the Data Type selection.
Label Text	Text that goes in the function field.
Default Label Text	The text that will appear on the form if no modifications were made to the label.
Normal or Bold	The weight appearance of the font.
Cancel	To exit this screen without saving your changes, click the Cancel button.
Close	If you want to save your changes, click Close to return to the main menu.

Settings—Forms Captions

Form captions allows for customizing what appears on the top left corner of a form when it becomes active.

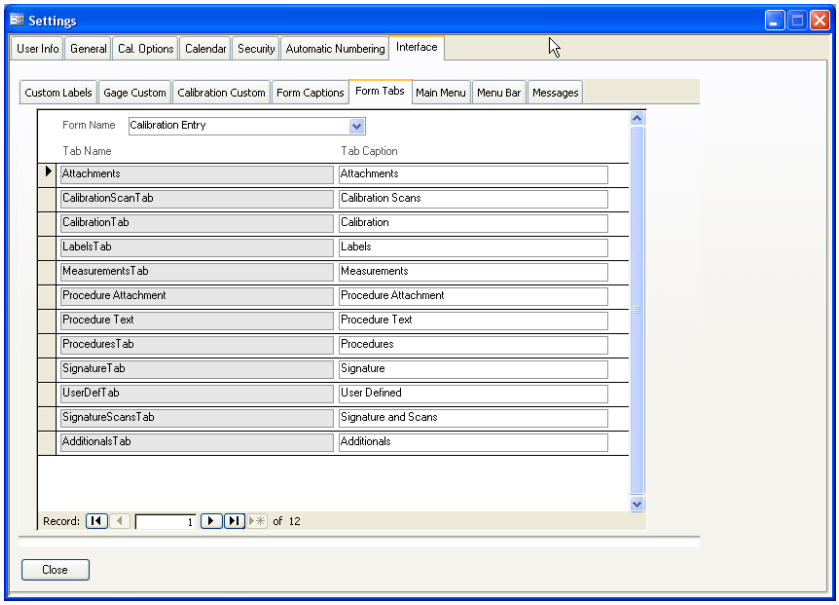


The table below describes the fields on this form:

Field/Button Name	Description
Form Name	Text defining the form in the title of the active window.
Form Caption	The name that is visible on the top left corner of the form.
Cancel	To exit this screen without saving your changes, click the Cancel button.
Close	If you want to save your changes, click Close to return to the main menu.

Settings—Form Tabs / Main Menu

The tabs within the main menu features can be revised to be more client expressive, for example the Measurements tab can be revised to read Capacity in Calibration Entry.



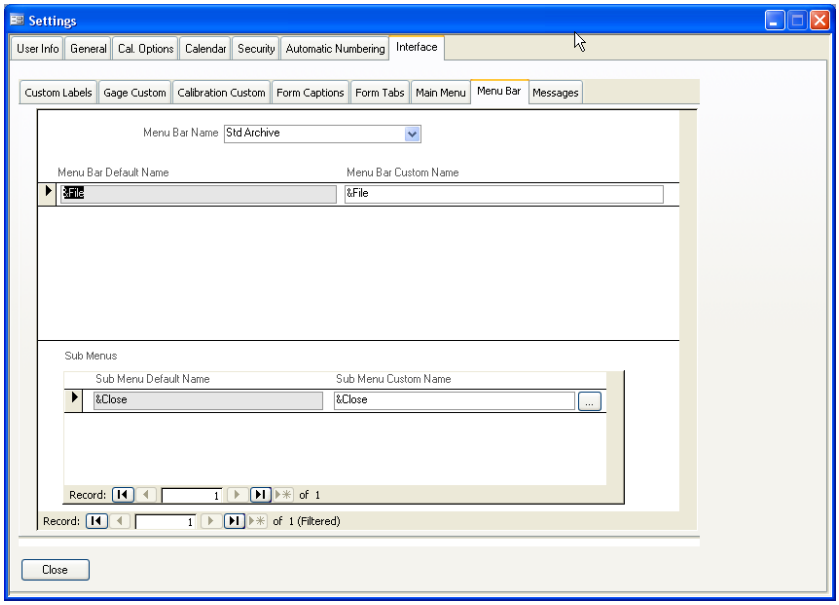
The table below describes the fields on this form:

Field/Button Name	Description
Form Name	Select a Form Name from the list box of available editable forms.
Tab Name	This is the default name of the tab within the select Form Name.
Tab Caption	Enter the new caption for the tab within the select Form Name.
Cancel	To exit this screen without saving your changes, click the Cancel button.
Close	If you want to save your changes, click Close to return to the main menu.

The Main Menu functionality is similar to Form Tabs but pertains to the main menu items instead. The Menu Name is the default menu description used in GAGEtrak and can be renamed in the Custom Menu Name field.

Settings—Menu Bar

The tabs within the main menu features can be revised to be more client expressive, for example the Measurements tab can be revised to read Capacity in Calibration Entry.

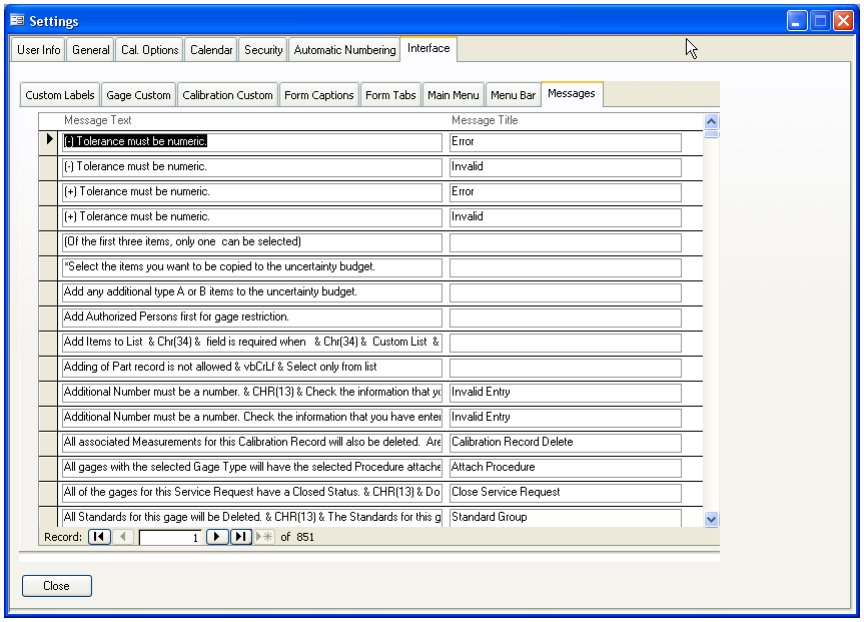


The table below describes the fields on this form:

Field/Button Name	Description
Menu Bar Name	Is the name of the menu group, for example: • Std Default MenuBar – the visible menu when any module is selected from the Main Menu. • Std Form MenuBar - the visible menu when entry forms are activated. • Std Form MenuBar Filter – add to *Bookmarks* filter
Menu Bar Default Name	The default name assigned to the field within the selected menu.
Menu Bar Custom Name	You can customize field values in the Menu Bar Custom Name field by entering a new value/text in this field, for example: changing `&File` with `&Options` will display Options on the menu bar instead of File.
Sub Menu Default Name	Default option names available under the main menu default name, for example: File as a main menu option will contain additional options such as Close etc...
Sub Menu Custom Name	You can customize field values under the Menu Bar Custom Name field by entering a new value/text in this field, for example: changing `&Copy` with `&Duplicate` will display Duplicate as a selection on the dropdown menu for Edit.
Cancel	To exit this screen without saving your changes, click the Cancel button.
Close	If you want to save your changes, click Close to return to the main menu.

Settings—Messages

The tabs within the main menu features can be revised to be more client expressive, for example the Measurements tab can be revised to read Capacity in Calibration Entry.


Settings
User Info
General
Cal. Options
Calendar
Security
Automatic Numbering
Interface
Custom Labels
Gage Custom
Calibration Custom
Form Captions
Form Tabs
Main Menu
Menu Bar
Messages
Message Text
Message Title
(-) Tolerance must be numeric.
Error
(-) Tolerance must be numeric.
Invalid
(+) Tolerance must be numeric.
Error
(+) Tolerance must be numeric.
Invalid
(Of the first three items, only one can be selected)
*Select the items you want to be copied to the uncertainty budget.
Add any additional type A or B items to the uncertainty budget.
Add Authorized Persons first for gage restriction.
Add Items to List & Chr(34) & field is required when & Chr(34) & Custom List &
Adding of Part record is not allowed & vbCrLf & Select only from list
Additional Number must be a number. & CHR(13) & Check the information that yo
Invalid Entry
Additional Number must be a number. Check the information that you have ente
Invalid Entry
All associated Measurements for this Calibration Record will also be deleted. Are
Calibration Record Delete
All gages with the selected Gage Type will have the selected Procedure attache
Attach Procedure
All of the gages for this Service Request have a Closed Status. & CHR(13) & Do
Close Service Request
All Standards for this gage will be Deleted. & CHR(13) & The Standards for this g
Standard Group
Record: 1 of 851
Close

The table below describes the fields on this form:

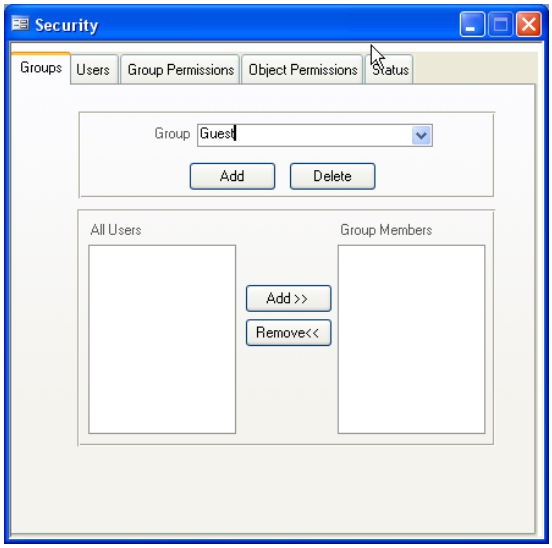
Field/Button Name	Description
Message Text	Input text to collectively explain the need for the message.
Message Title	Select a simple title that allows explains at a glance what the message is pertaining to, for example: "Cannot open file," contains the message, "Unable to View/Print the selected File. Please make sure that the file exist or is not corrupted."
Cancel	To exit this screen without saving your changes, click the Cancel button.
Close	If you want to save your changes, click Close to return to the main menu.

Setup—Security

From the Security menu, you can assign different rights to the program for each user. Users belong to groups and inherit the security rights of each group they belong to.

Security—Groups

You can add or remove user groups and members using this screen.



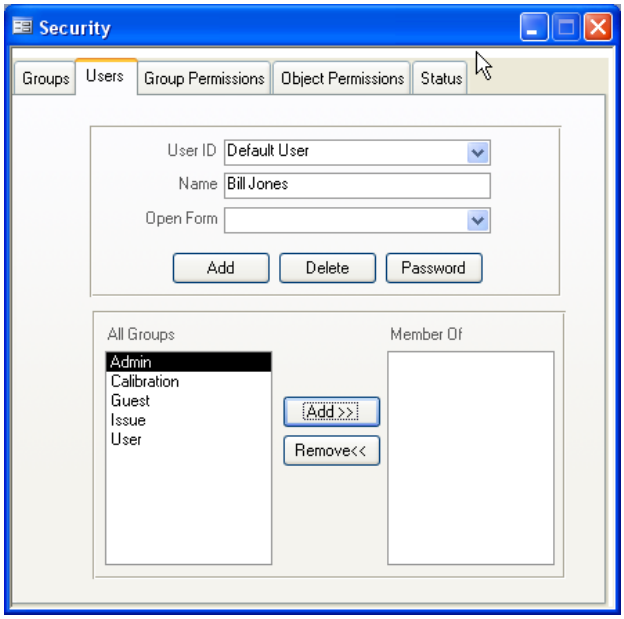
It is easiest to set up security on the group level. Five groups come with GAGEtrak 6.7: Admin, Calibration, Guest, Issue, and User, (you can add more groups as needed). When you add a new group you can copy the permissions from another group, then go to Group Permissions for the newly defined group and set up the necessary permissions.

The table below describes the fields on this form:

Field/Button Name	Description
Group	Select the group name you want to view or enter a new group name and click Add.
Add and Delete Buttons	Adds or removes the group to or from the current listing in the Group dropdown list box.
All Users List Box	When a user is defined in the Users section of this module the default Group names are available for individual assignment. Therefore if an existing Group name is selected the users assigned to the Group name will be visible in the All Users list box on this form. If the Group name is a newly defined group the administrator will have the opportunity to copy permissions from other groups.
Group Members List Box	List box comprised of users belonging to a selected Group name.
Add>> Button	Select a user or group of users from the All Users field and click the Add>> button to add to the Group Member list box of the currently selected group.
Remove<< Button	Select a group member or members from the Group Members field and click the Remove<< button to remove the selected groups from the list box.

Security—Users

Add and remove application users using this screen.

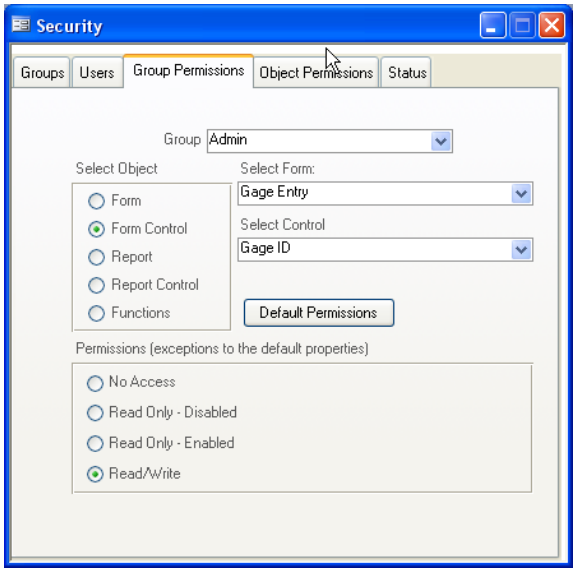


The table below describes the fields on this form:

Field/Button Name	Description
User ID	Select the user you wish to view or enter a new user name. **Note: If a User ID is the same as a retired User ID in 21 CFR Part 11 the retired user ID cannot be duplicated.**
Name	Full name of this user.
Open Form	Select the form that you want this user to see when the application starts.
Add and Delete Button	Add or delete a user from the current user listing. **Note: If 21 CFR was selected upon installation and the Default account with Admin rights is deleted, a new Default User will be created upon re-login. If Standard was selected upon installation and Enable Security was enabled after an Admin user was added and then deleted, the application will automatically open without login restrictions and Enable Security will still be activated.**
Password Button	Select this key to add or change the current users password.
All Groups List Box	When a User ID is entered in the User ID field the default or added Group names become available in the All Groups list box and are available for user to be a Member Of assignment.
Members Of List Box	Group selected user has been assigned to.
Add>> Button	Select from the All Groups list and click this button to add the group or groups in which this user will be a member.
Remove<< Button	Select a group or groups from the Member Of list and click this button to remove user membership.

Security—Group Permissions

Modify group access permission to the different forms and reports of the program.

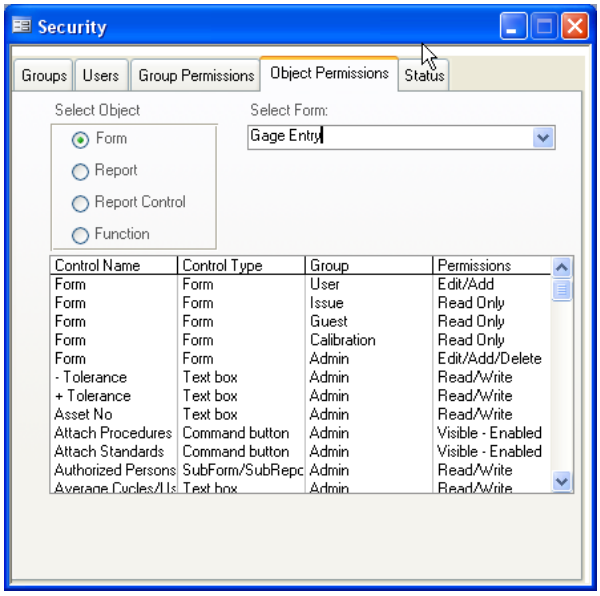


The table below describes the fields on this form:

Field/Button Name	Description
Group	Select the group for which you want to establish permissions.
Select Object	Select the type of object to set permission rights for, for example: *Form*, *Reports*, *Controls*, and *Functions*.
Select Form / Report / Control or Functions	Dependent on what was selected in Select Object, there will be one or more combo boxes here. For form, report, or Functions, select the item you want to set security rights. For form control or report control, select the form or report, then select the control on that form/report that you want to set security rights.
Permissions	Select the permission to be assigned to the object. For available *Permissions* select a form or report first.

Security—Object Permissions

This form is used to view a comprehensive list of objects and permissions for a selected form, report, control or function.

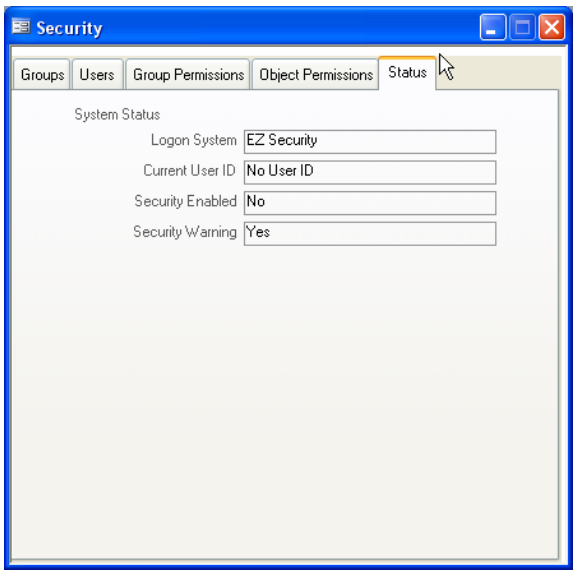


The table below describes the fields on this form:

Field/Button Name	Description
Select Object	Select the type of object for which you would like to view permissions.
Select Form / Report / Control or Function	Dependent on what object was selected will be what is available for selection, for example: selecting Form will require you to select a form from the dropdown list box. When the form is selected a comprehensive list of all Control Name and Type, Group and Permissions are available for viewing.

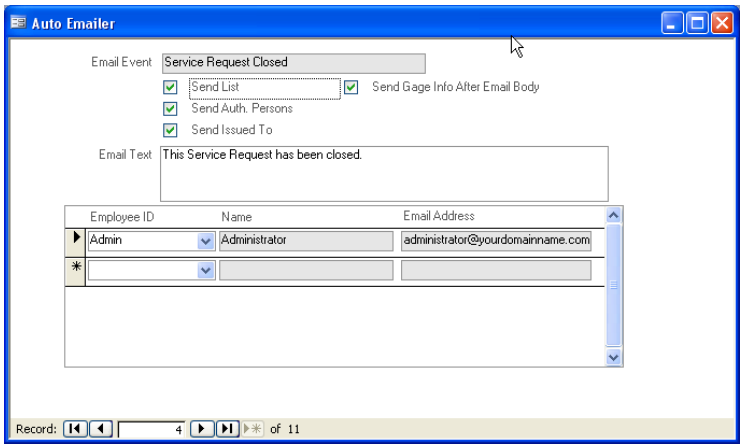
Security—Status

The screen below shows the current security status of GAGEtrak.



Setup—Auto Email Header

The Auto Email Header function allows plain text emails to be sent automatically from the program based on the Email Event selection. The Email Event list is predefined, and entries cannot be added to or deleted.



The table below describes the fields on this form:

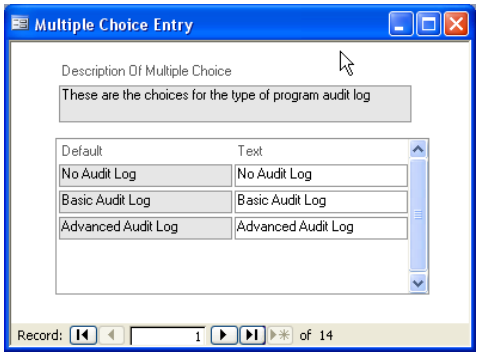
Field/Button Name	Description
Email Event	Select the event you would like to modify. The predefined email events are: • Gage Issued Out – when a gage is being issued from the Gage Entry | Issue / Return or either the Issue Gage form.

Field/Button Name	Description
	• Gage Returned – when a gage is being returned from the Gage Entry | Issue / Return or either the Return Gage form. • Automatic Gage Due Listing – sends an email automatically when the application is opened. The list of gages due is based on the filter criteria created on the automatic due report. • Cal Due Listing –will be sent from the Calibration Due report. • Gage Added to Service Request – will be sent when a gage is added in Service Request Entry. • Gage Status Closed – sends when a gage status is changed to Closed in Service Request Entry. • Service Request Closed – will be sent when the Service Request Status has been changed to Closed in Service Request Entry. • Calibration Passed – is generated when the checkbox in Calibration Entry is checked. • Gage Limited – will send when the Pass checkbox in Calibration Entry or importing a Passed record from a PDA when one or more measurements have the limited checkbox checked. • As Found Condition Out – will send when Passed is selected under Calibration Status in Calibration Entry or importing a Passed record from a PDA. • Calibration Status Change – will send when the Pass checkbox in Calibration Entry or importing a Passed record from the PDA when the Calibration Status is anything other than Passed.
Email Selection	The following selection will provide the following results: • Send List / Send Issued To – when selected a list of all gages that have a due date on or before the current data will be created and included in the email body. • Send Auth. Persons – an email will be sent to the list of person in the Gage Entry | Auth. Persons form, is the Restrict Issue is set to either Not Restricted or Program Default. • Send Gage Info After Email Body – if selected the body of the email will contain the following information: Gage ID, Description, Model N., Current location, Issued To, Issued Dept., and a text message specific to the Email Event triggered.
Email Text	Content included in email transmission.
Employee ID	Select staff personnel from the dropdown list box that will be emailed when added to an Email Event.

Setup—Multiple Choice Entry

Selecting this module allows a user to edit built in program lists. For example: In Gage Entry | Calibration Schedule you will notice that for Calib Freq the user has the opportunity to select a predefined UOM from the dropdown list of choices, (this is one of 15 lists of choices that can be edited based on the users needs).

If the user would like Days to reflect “No. of Days” this is the module that will allow you to make that revision. Changing the text does not effect how the program uses this field. It merely changes what the user sees on the screen, and any changes made to the text fields will appear throughout the program.



The table below describes the fields on this form:

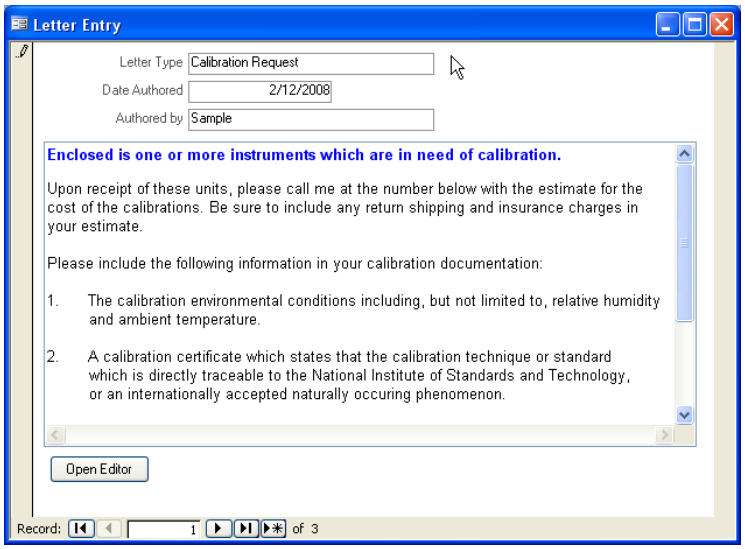
Field/Button Name	Description
Description of Multiple Choice	Explanation of where choices are used and what they are used for.
Default	Un-editable values for available choices in built in list.
Text	This is an editable field, and is where the new text for a predefined list can be entered.

This module only permits editing of the text fields. The user will not be able to add or delete any items from this module.

Setup—Setup CA/Service Request

The CA/Service Request form from the Setup menu automatically generates a letter for preview and printing based on a predefined letter format. To set up service request letters or corrective action request notices, choose Setup CA/Service Request from the Setup menu.

The Letter Entry screen will appear. Here you can enter the Letter Type, Date Authored, Authored By, and the Body of the letter. Enter as many letters as you need.


Letter Entry
Letter Type
Calibration Request
Date Authored
2/12/2008
Authored by
Sample
Enclosed is one or more instruments which are in need of calibration.
Upon receipt of these units, please call me at the number below with the estimate for the cost of the calibrations. Be sure to include any return shipping and insurance charges in your estimate.
Please include the following information in your calibration documentation:
1. The calibration environmental conditions including, but not limited to, relative humidity and ambient temperature.
2. A calibration certificate which states that the calibration technique or standard which is directly traceable to the National Institute of Standards and Technology, or an internationally accepted naturally occuring phenomenon.
Open Editor
Record: 1 of 3

The table below describes the fields on this form:

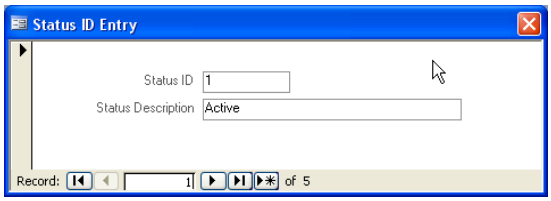
Field/Button Name	Description
Letter Type	Name of the letter (must be unique name).
Date Authored	Date letter was written.
Authored by	Name of person that developed the letter.
Body	Body, or main contents, of the letter.
Open Editor	Select this button to open the letter contents in the .RTF editor. **Note: This editor supports rich text; therefore text defined in another word editor such as MS Word can be copied and pasted into GAGEtrak.**

Setup—Status ID Entry

Select this utility to enter the descriptions you want to appear in the Status drop-down list in Gage Entry.

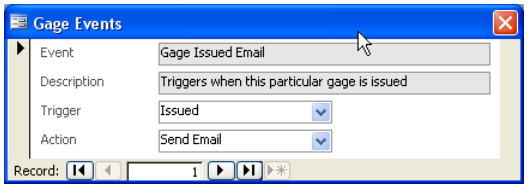
You **must** use the status ID "1" for current gages because the "1" tells GAGEtrak that the gage is active. On Calibration Due Listings, Calibration Work Orders, and Calibration Schedules, GAGEtrak includes only active gages—those marked with status ID "1". Therefore, **do not delete** status ID 1 (*Active*).

The default Status Descriptions that come with GAGEtrak are Active, In-Active, Out For Repair, In Calibration, and Lost. You can change these descriptions or add additional Status Descriptions as required by your company; for example, you may need to add Retired, Sealed or Loaned Out.



Setup—Gage Events

Select this utility to establish events that can be associated with a particular gage when Calibration Entry | Events is selected.



When an event is triggered an action can be performed such as running an external application like opening up a Microsoft Word document or initiating a transmission of an email.

Note: As a user, you can add additional Gage Events that will be triggered by one of the available selections listed under Trigger. The Trigger list is predefined and is non-editable, as are Actions.

The table below describes the fields on this form:

Field/Button Name	Description
Event	Name of the event that will be visible in the Events dropdown list box in Gage Entry | Events.
Description	Describe the action triggered when the event is selected.
Triggered	What causes the event to initiate?
Action	What will happen once the event has been triggered?

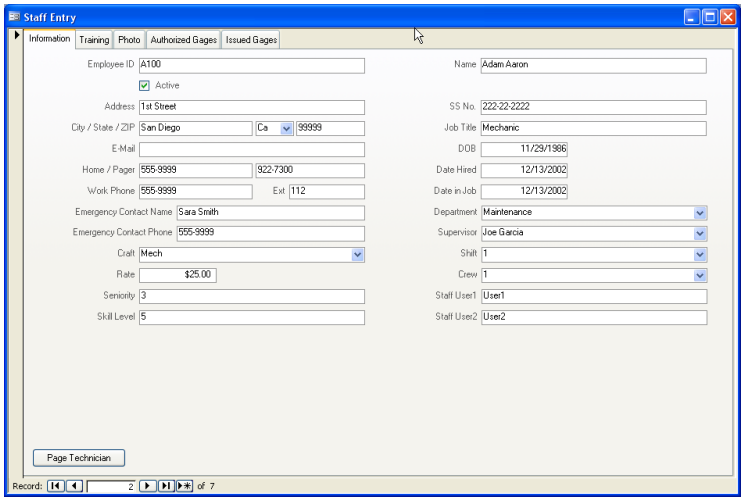
Chapter 5: Entering Personnel

Select the Personnel menu to enter user records.

Staff Entry

In Staff Entry, you can enter and view detailed employee records for your staff, including information like training, ID photo, what gages their authorized to use, and whether a gage has been issued to them.

Staff Entry—Information

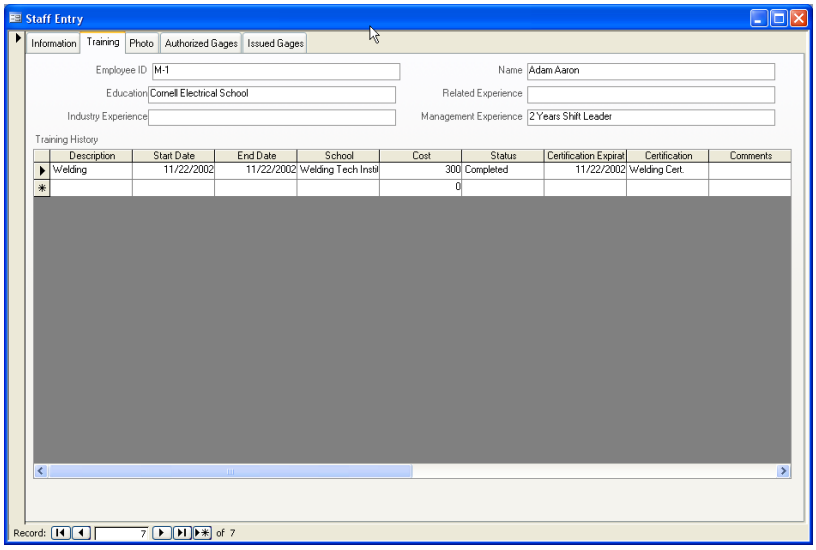


The following table explains each of the fields and buttons in this screen:

Field Name	Description
Employee ID	Enter a unique alphanumeric identifier for each employee.
Name	In this field, enter the employee's full name.
Active	Check this box to show that the employee is currently active. If you don't mark the employee as active, his or her name won't appear on reports that list available employees.
Address, City, State, and Zip	Enter the employee's mailing address, including city, state, and zip code.
E-Mail	Enter the employee's e-mail address.
Home/Pager and Work Phone/Ext.	Enter the employee's home phone number, pager number, work number and extension.
Emergency Contact Name and Phone	Enter a person's name and phone number to contact in case of emergency.

Field Name	Description
Craft	Use this field to categorize your workers by profession. You can use a description, such as welder or electrical engineer; a code, like `MIG-3`; or a union number combined with a classification, such as `786-Journeyman` or `786-Apprentice`.
Rate	Enter the employee's hourly rate.
Seniority	Enter the seniority or other work status of the employee. You could use this field to store the date that determines seniority.
Skill Level	Using either an internal or external classification system, assign a skill level to each employee. You could also use this field to indicate multiple skills for your employees, assigning letters or numbers for different skills.
SS No.	Enter the employee's social security number.
Job Title	Enter the employee's official job title.
DOB	Employee's date of birth.
Date Hired and Date in Job	Enter the date(s) in which you hired the employee and when the employee started his or her current position.
Department	Enter the primary department the employee belongs to.
Supervisor	Enter the name of the employee's direct supervisor.
Shift	Indicate the shift(s) for which this employee is available.
Crew	Use this field to track the name of the crew(s) to which this employee either belongs or is qualified to belong.
Staff User 1 and Staff User 2	Use these two fields to store any additional employee related information.

Staff Entry—Training



Use the Staff Entry—Training screen to keep track of the employee's current and continuing education. The table below describes the fields in this screen:

Field Name	Description
Education	Give a basic description of the employee's education, for example: `BS – Mechanical Engineering.`
Industry Experience	Enter the employee's work experience, for example: `6 years Inspection Technician, Grade II.`
Related Experience	Use this field to track any other useful experience, such as `AutoCAD 3-dimensional wire diagramming.`
Management Experience	Enter any management experience that the employee has–for example, `Supervised Calibration Inspection Dept. in 2008.`

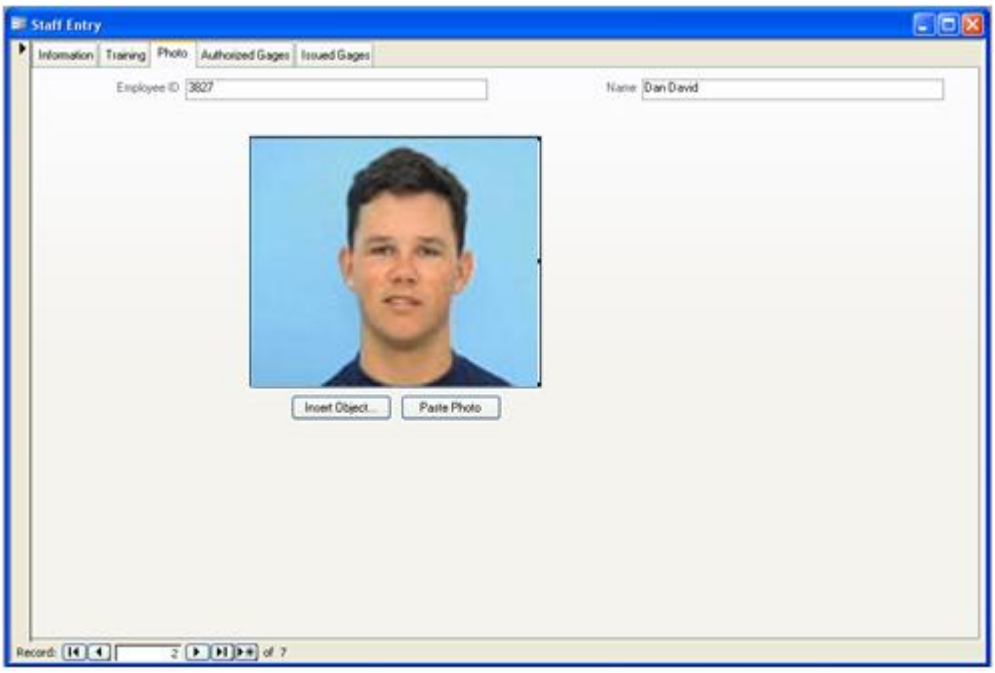
Training History

In this section, you can track classes or certifications that each employee has completed. Use the scroll bar at the bottom of the screen to see the different fields.

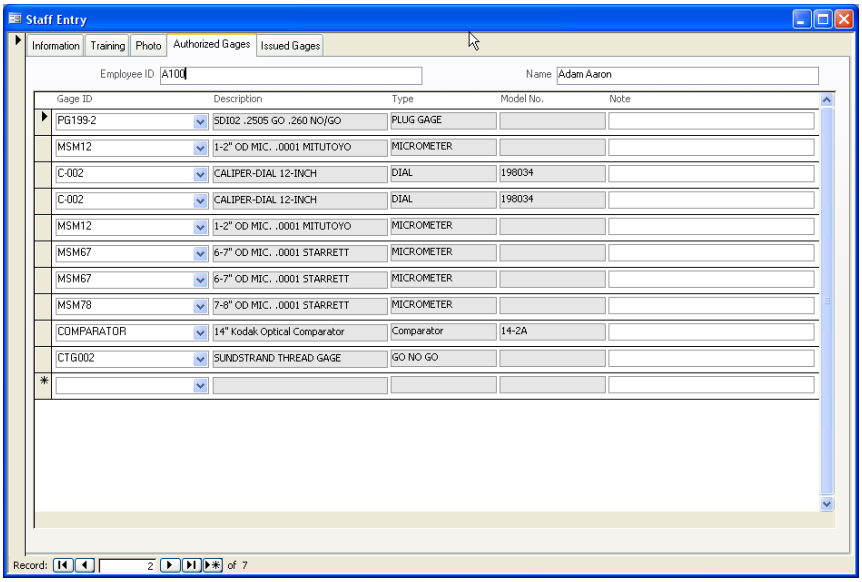
Field Name	Description
Description	Enter a brief description of the training.
Start Date and End Date	Beginning and ending dates of the training.
School	Enter the name of the school where the employee attended training.
Cost	Enter the cost of the class.
Status	Use this field to indicate whether the employee has finished this particular class.
Certification	If this training was for a particular certification, enter the type of certificate.
Cert. Expiration Date	If the certification is good for only a specified length of time, enter the expiration date in this field.
Hours	Enter how many hours the training was worth or how long it lasted.
CEUs (Continuing Education Units)	In this field, enter the number of credit units earned for the training.
Comments	Enter any other relevant information for this training or certification.

Staff Entry—Photo

Click this tab to attach a personnel photo; for more information, see Insert Object and Paste Logo for more information.

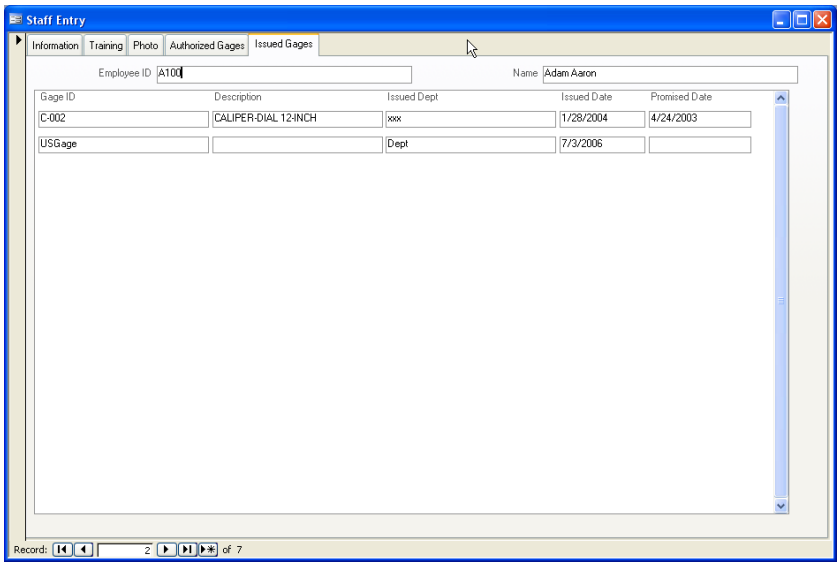


Staff Entry—Authorized Gages



In this screen, you can add a list of gages that an employee is specially permitted to use. Gage selection is limited to the dropdown list. Once selection is made the gage: Description, Type, and Model No. fields will automatically populate with Gage ID related information. To the right of the Gage ID criteria is a Note field that can be used document special instructions, etc…

Staff Entry—Issued Gages



In this screen, you can view but cannot edit the list of gages that are currently checked out to this employee.

Chapter 6: Data Tools

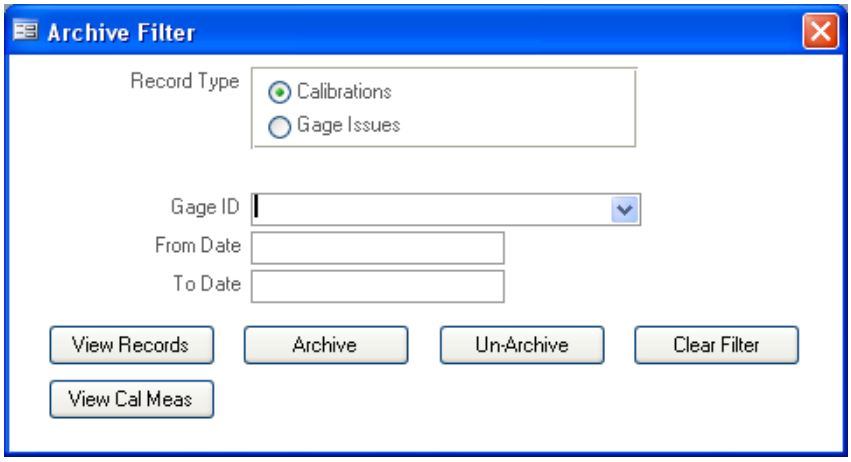
In addition to setup features, the Data Tools menu also contain functions that help you maintain your program and database. In this chapter, we'll discuss these utilities, including archiving or un-archiving records; backing up your data; and exporting or importing records.

Data Tools—Archive/Un-Archive

Use this utility to archive or un-archive your calibration and gage issue records. *Archive* moves your records from the current group and puts them in a storage location within the database. This makes your current group of records smaller and your database faster. An archive is not the same as a backup.

Remember: Always make a backup copy of your database file before you archive!

When you select this feature, the following filter will appear:



You can archive your calibration or gage issue records by Gage ID or by Date. To archive by Date, enter the beginning date in the From Date field and the ending date in the To Date field. When all criteria have been entered, click the Archive button.

Tip: In Settings | Security **you have the ability of specifying if** Unsigned / Unapproved Calibrations **can be archived.**

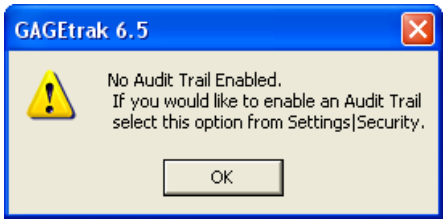
To view the archived records, click either the View Records or View Cal. Meas. button. To put archived records back into the current record group, set up the criteria in this screen and click the Un-Archive button.

Archived records are stored within the database. After you archive records, you can decrease the size of your data file by running Compact Data from the Data Tools menu group.

Data Tools—Audit Log

You can click this Audit Log button to view the audit trail, if you have enabled an Audit Trail in the Security tab of the Settings screen under Setup.

If the 21 CFR Part 11 compliant version of GAGEtrak was installed during setup, all audit trail records are retained permanently. With the standard installation of GAGEtrak you have the opportunity to select any type of audit trail tracking. If No Audit Trail is selected and the Audit Trail button is selected in Data Tools you will be presented with the following message:


GAGEtrak 6.5
No Audit Trail Enabled.
If you would like to enable an Audit Trail select this option from Settings|Security.
OK

When OK is selected the Advances Audit Trail form will be displayed for your reference, but the system will NOT be tracking any records until an audit trail has been selected.

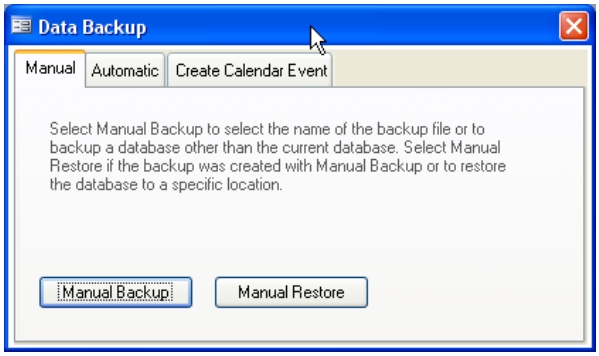
Data Tools—Backup/Restore

You should periodically back up your GTDATA65.MDB database file (we suggest that you do so every day). We recommend that you use GAGEtrak's built-in Backup/Restore function for this task. However, if you have a specialized backup product (such as Colorado Backup, Zip Drive, or another network backup utility), you can use that product instead.

GAGEtrak's Backup/Restore utility works only with MS Access databases. If you are using MS SQL you must use backup and restore utilities designed for SQL. See your System Administrator, as these are not included with GAGEtrak.

Backing Up Data

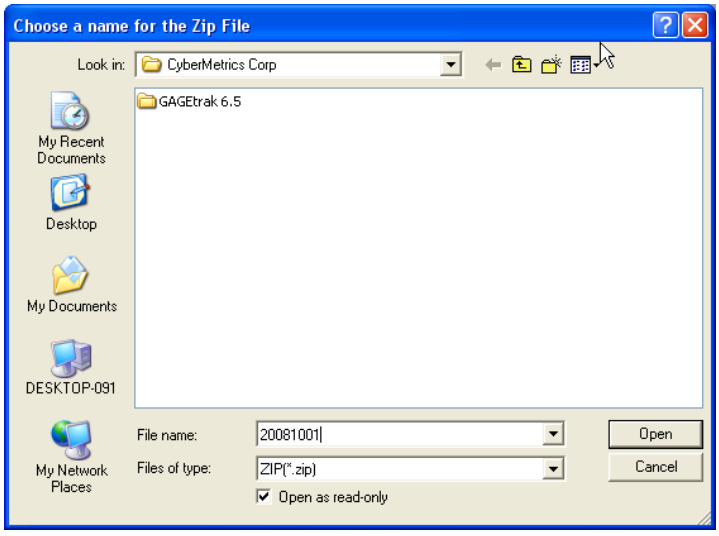
Click on the Data Tools icon in the main menu, then click on the Backup/Restore button. The Data Backup window will appear as shown below:


Data Backup
Manual
Automatic
Create Calendar Event
Select Manual Backup to select the name of the backup file or to backup a database other than the current database. Select Manual Restore if the backup was created with Manual Backup or to restore the database to a specific location.
Manual Backup
Manual Restore

From this window you may choose Manual Backup, Automatic Backup, or Create Calendar Event by clicking on the appropriate tab.

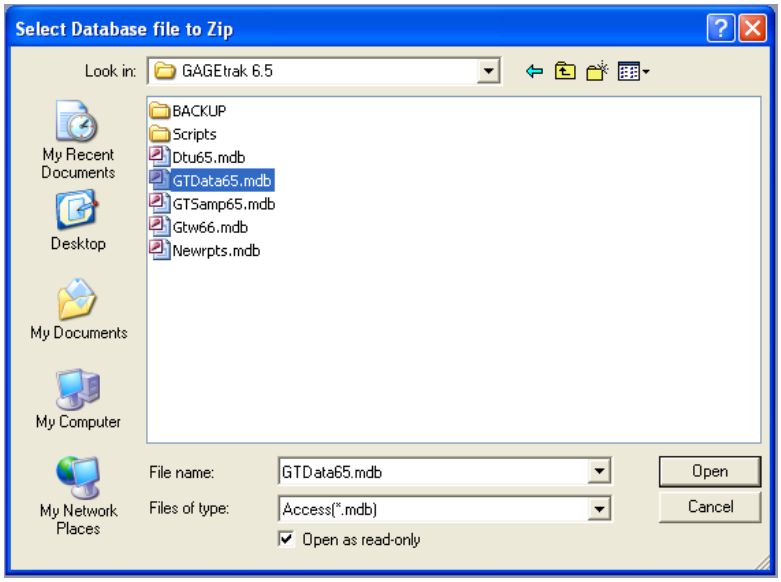
Manual Backup

Choose Manual Backup if you wish to specify the name of your backup file or to back up a database other than the one you are currently using. To start the backup procedure, click on the Manual Backup button. You will be prompted to choose a name for the zip file now; the dialog box shown below will appear:



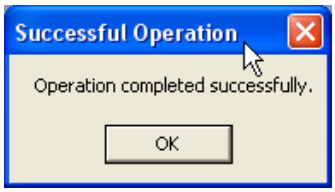
Select the drive and enter a name for the backup ZIP file. For example, you could save October 01, 2008's backup as "20081001.ZIP". For additional security, the user can periodically create a CD or DVD with the backup files. Consult your CD or DVD creation software manual for more information.

Next, select the database file to add to your ZIP file. Choose your data file (GTDATA65.MDB) and click the Open button.



Tip: If your database is on your server, you must change the drive letter to your network drive and select the appropriate folders, then highlight GTDATA65.MDB. If you aren't sure where your database is located, check the database location on the lower right corner of the main menu before you back up your database. If you use more than one database with GAGEtrak, back up each one of your databases separately.

When the backup is finished, you'll see this message:



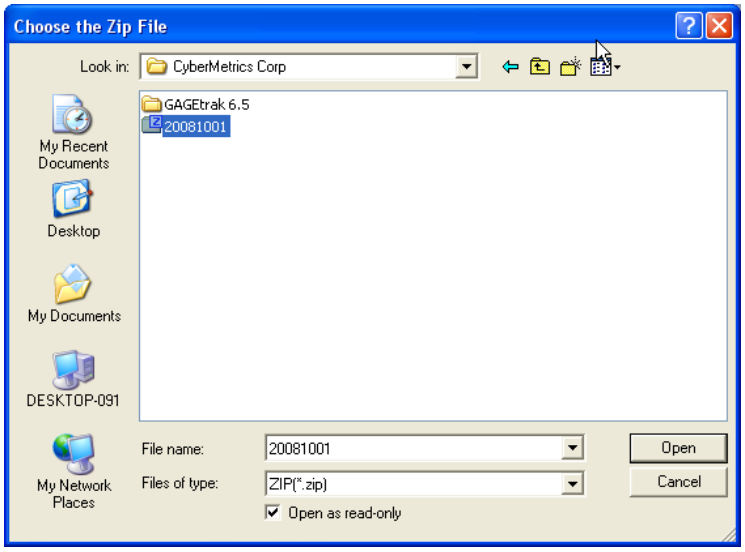
Your data is now backed up.

The resulting backup files will be compressed in the industry standard ZIP format. This means that you can use other utilities, such as PKZIP, PC-Tools, WinZip, or Norton, to restore your backup file.

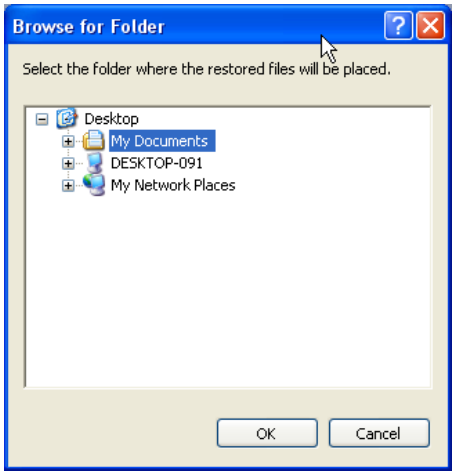
Manual Restore

To restore your database file, click the Manual Restore button under the Manual tab of the Data Backup window.

A dialog box will appear; highlight the file you want to restore (unzip) and click Open.

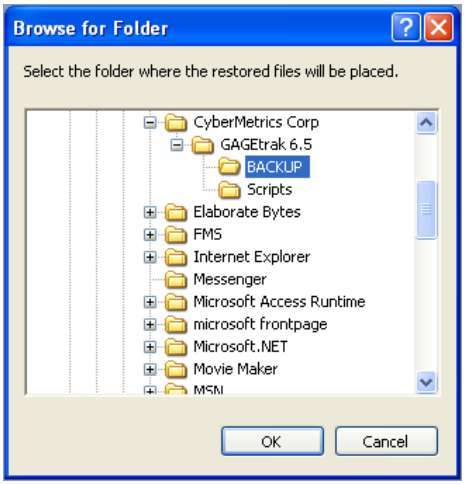


Now choose the drive and directory you want to restore the backup ZIP file to.

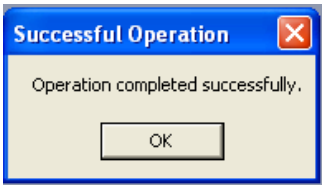


Note: When you restore your database, restore it to a different location than your current database location. The **Restore** utility contains a safeguard that prevents you from overwriting your current database, even if you try to do so. This safeguard lets you alternately open your restored and current databases to compare them in case you suspect that you've lost data because of a corrupted database.

Use a folder named “Backup” as the location for your restored database, as shown here:



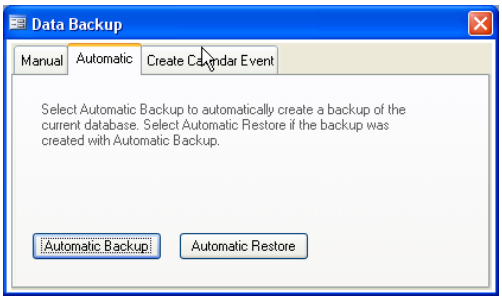
Click OK to begin the Restore operation. When it’s finished, you’ll see this message:



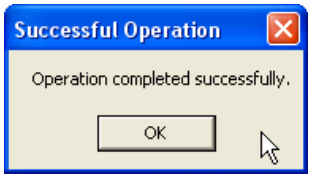
Tip: If you’ve replaced your hard drive or are installing the software to another computer, re-install GAGEtrak first, then restore your backup database file.

Automatic Backup

Choose Automatic Backup to create a backup of the current database automatically. To start the backup procedure, click on the Automatic Backup button. If the user has done a manual backup, then it backs up to the directory where the user last did a manual backup. If the user hasn't done a backup on that workstation, then the backup is to the directory where the database is. The application does not backup SQL databases.


Data Backup
Manual
Automatic
Create Calendar Event
Select Automatic Backup to automatically create a backup of the current database. Select Automatic Restore if the backup was created with Automatic Backup.
Automatic Backup
Automatic Restore

When the backup is finished, you'll see this message:

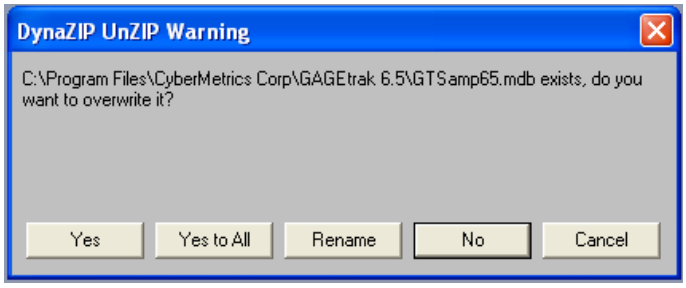


Your data is now backed up. The resulting backup files will be compressed in the industry standard ZIP format. This means that you can use other utilities such as PKZIP, PC-Tools, WinZip, or Norton, to restore your files.

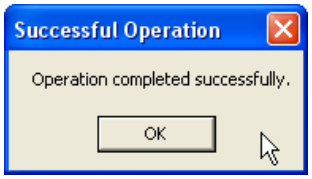
Automatic Restore

To restore your database file, click the Automatic Restore button in the Automatic tab of the Data Backup window.

If a database file exists with the same name as the database file you are restoring, you will be prompted to rename the file you are restoring:



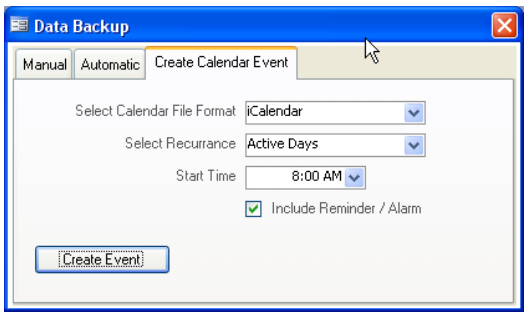
Click Yes; enter the new name of the file in the dialog box that appears and click OK to extract the file. (GAGEtrak will not permit you to overwrite your current database; you *must* rename the file). When extraction is complete, you'll see this message:



Note: After completing the Automatic Restore operation, you must attach to your restored, renamed database. You can do this by selecting Open Database… **from the** File **Menu and browsing to the new database file (it should be in the same directory as the database file you backed up).**

Create Calendar Event

Choose Create Calendar Event if you wish to create a backup reminder event for your electronic calendar application.

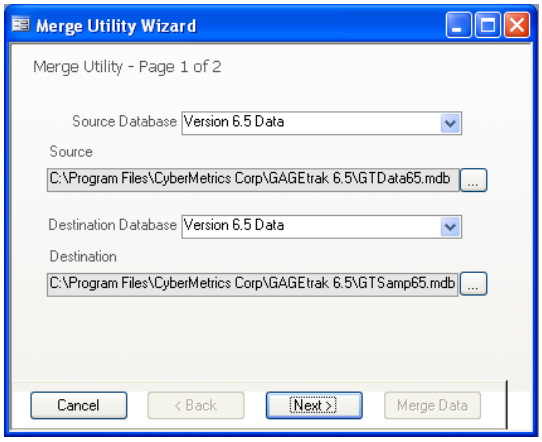


Field Name	Description
Select Calendar File Format	Select the file format that the calendar event will use. iCalendar is a multi-platform standard used with newer electronic calendar applications and allows more functionality like Recurrence and Alarms. vCalendar is an older standard that does not support Recurrence or Alarms.
Select Recurrence	Select whether the event will be scheduled Every Day of the week or if it will only be scheduled on Active Days. Active Days are determined by days of the week in Settings – Calendar – Skip Dates Entry.
Start Time	Select the time of the day when the reminder will be scheduled.
Include Reminder / Alarm	Check this box to include an electronic reminder when the event is due. The nature of the alarm depends on the nature and configuration of the electronic calendar application
Create Event	Create an event based on the settings in this form and export it to the default electronic calendar application. If you wish to email this event to another user, the event can be found in the default application directory C:\Program Files\CyberMetrics Corp\GAGEtrak 6.7 .

Important Note: This utility will not perform the backup of the database. All it does it create a reminder to perform the backup. It is the administrator's responsibility to insure that the correct database is being backed up on a regular basis.

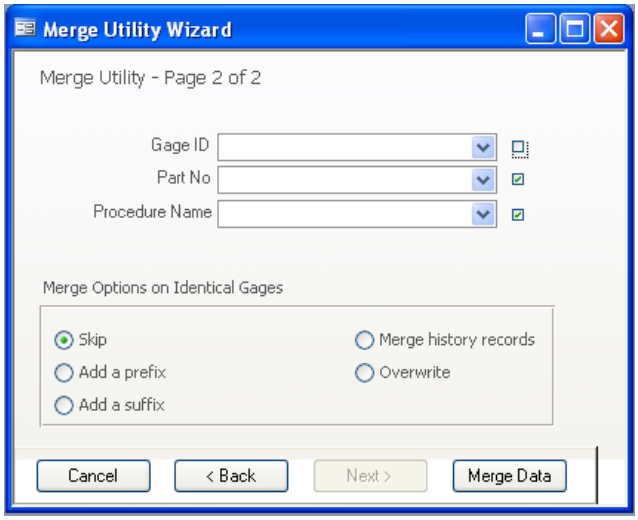
Data Tools—Merge Utility

The Merge Utility lets you merge elements from different databases, for example you can merge a single gage record into another database. This can be archived by selecting the Merge Utility from Data Tools.



This screen lets you merge data from another GAGEtrak database into your current database. The Source Database is the database where data is being retrieved from, and the Destination Database is the database accepting the data.

If particular records are needed from the source database the Merge Utility lets you select a single *Gage ID, Part Number,* or *Procedure Name* to merge from the dropdown list box. If all records from the source database need to merge into the destination database select the checkbox to the right of Gage ID, Part No., or Procedure Name for entire database merging.



The Merge Options on Identical Gages are options that can be used to determine the exact operations required to merge the records when identical equipment ID's are found.

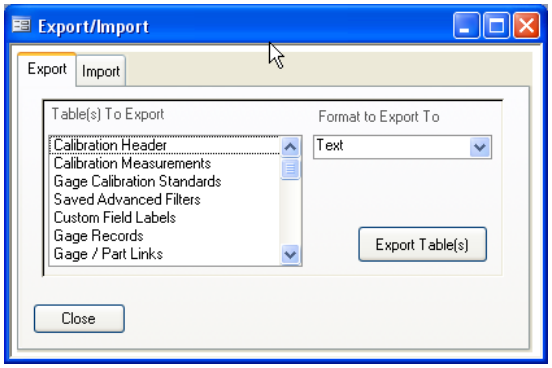
Note: This procedure merges data from the Source to the Destination database and can be a time consuming process dependent on the quantity of records being merged.

Data Tools—Compact/Repair Data

Whenever you delete a record, the program doesn't *actually* delete the record—it only marks it as deleted and then re-uses the space whenever you add new records (i.e., your data file size does not decrease). If you delete many records, you should compact your data file so that the program actually removes these records, decreasing the size of the data file. You can do this by running Compact/Repair Data from the Data Tools menu.

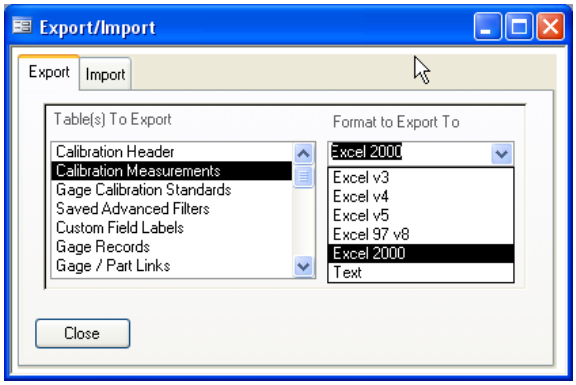
Data Tools—Export/Import

For your convenience, GAGEtrak includes an automated export program. To export or import data, from the menu select Data Tools | Export/Import. This screen will appear:



Exporting Data

From the left side of the Export screen, highlight the table(s) you want to export, and from the right side of the screen, choose the *Export To* file format.



Each table that you can export has a corresponding filename, so you don't need to name your export files. The filenames are based upon the destination/source tables plus the appropriate extension for the file type. For example, a text file from the Parts Master table will be named PARTS.TXT; the same file sent to an Excel file will be named PARTS.XLS.

The Export utility places these files in the same directory as your program file.

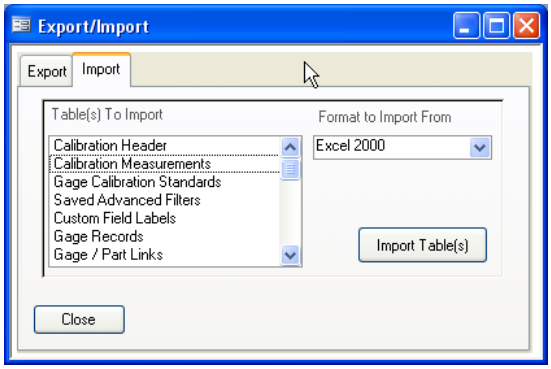
Table Name	Export Filename	Helpful Information
Calibration Header	CalHead	Every calibration record will be present in the Calibration Header table.
Calibration Measurements	CalMeas	Not every Calibration Header record requires a corresponding Calibration Measurement record. The Calibration Measurement table contains only calibrations that include actual calibration standards/measurements. One Calibration Header record may have many corresponding calibration records.
Gage Calibration Standards	CalStd	This table links gages to their calibration standards.
Saved Advanced Filters	Search	This table stores all saved filter criteria from the Advanced Form Filter.
Custom Field Labels	Fields	This table stores the text for form labels. This table should not be imported into the database.
Gage Records	GageMast	All Gage Entry information is contained in this table.
Gage / Part Links	GageReqs	In this table, gages are linked with parts.
Gage RR Results	GRR	This table stores all of your gage R&R studies and results.
Gage Issue Tracking	IssueTrk	All Gage Issue and Return information is in this table.
Service Request Letters	Letter	The form letters you create for repairs, service requests, or calibrations are stored in this table.
Service Requests	SrvReq	This table contains the service requests that you've entered into GAGEtrak.
Part Records	Parts	In this table, you'll find all of the Part Entry information.
Gage / Procedure Links	ProcLink	This table links gages with procedures.
Procedure Records	Procs	Procedures are stored in this table.
Calibration Results	RsltCode	The Result Codes table stores your Automatic Frequency Adjustment factors.
Skip Dates	SkipDate	This table stores all of the dates that the program skips when it calculates Next Due Dates for gages.
Standard Group	StdGroup	This table stores the standards ID, nominal, etc values for each standard group. One standard group may have no, one, or more entries in this table.
Standard Group Header	StdHead	This table stores the information for the standard group itself. Each standard group will have one header record.
Gage Status	Status	The Status table contains all of your gage status options.

Table Name	Export Filename	Helpful Information
Supplier Records	Supplier	The Supplier table stores all of your supplier information.

After you've selected one or more tables to export, click the Export Table(s) button. The Export program automatically sends the file(s) to the directory where your program file resides. When the export is finished, a message will tell you that GAGEtrak has successfully exported the tables.

Importing Data

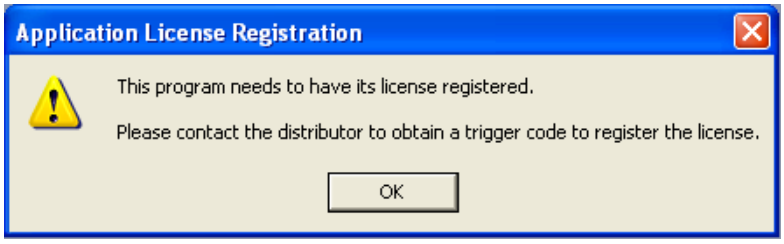
You can import data into the same tables from which you can export, using the same filenames and file types as for the Export utility.



The easiest way to import data is to first export data from GAGEtrak's empty database to the file format of your choice. You'll then have the exact import configuration in place for the file. Next, open the file and duplicate its configuration for a file you already have or add the records you want to import to the file created by the export. In order to import files, you must name them as shown, with the appropriate file extension of .TXT or .XLS. Make sure that you put the files you're importing into the same directory as your GAGEtrak program file.

Data-Tools —Modify License

Modify License is only required when GAGEtrak's license registration period is about to lapse. When you first run GAGEtrak, you will be presented with the following message:


Application License Registration
This program needs to have its license registered.
Please contact the distributor to obtain a trigger code to register the license.
OK

Seven days before the license registration period expires, GAGEtrak will begin a countdown to the end of the registration period. For your convenience, this period will not expire on a Saturday or a Sunday.

If you have entered your serial number and you have an active Internet connection select the Get Trigger Online button on the Modify License form. Depending on your operating system's configuration, the application will either:

a. Automatically obtain the Trigger Code, register the application license, and close the Modify License form. In this situation, no further action is required.

b. Open the Trigger Code website, fill in the required information, and obtain a Trigger Code. In this situation, enter the Trigger Code from the website into the Trigger Code text box in Modify License and click 'OK'.

At this point you will get a message saying the application license has been registered. This can be confirmed by opening the About Box and looking at the control labeled License Registration Date.

Once the application license has been registered, it will remain registered for that Windows account on that workstation even if the software application is reinstalled in the future.

If you purchased a multi-user license, please contact our support team to increase the number of triggers available to your company. If you have difficulty obtaining your trigger code, please contact our support team at 480-922-7300.

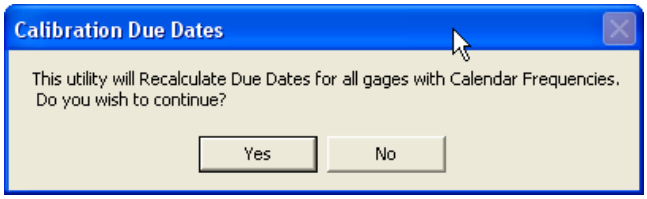
Data-Tools — Reset messages

This option resets the program messages back to their default values. This option should only be used when Technical Support advises you to do so.

The following features could potentially cause undesirable effects to the data within the application if used without a full understanding of their use. Please consult your systems administrator and or call CyberMetrics Technical Support prior proceeding.

Data Tools - Calculate All Due Dates

If you need to re-calculate calibration due dates, select this utility. For example, if you change the calibration frequencies on all of your micrometers from `65 Days` to `90 Days`, and you have 50 micrometer records, it's easier to run this procedure than manually click the Next Calib. button on the Gage Entry window for those 50 records.
You'll see the message shown below when you select this utility:


Calibration Due Dates
This utility will Recalculate Due Dates for all gages with Calendar Frequencies.
Do you wish to continue?
Yes
No

Click Yes to have GAGEtrak calculate the Next Due Date for every Gage Entry record, based on Calibration Frequency and Last Due Date. It deletes or overwrites any manually entered dates, and dates calculated by issue tracking

Data Tools - Edit All Tables

This utility provides a direct interface for you to make changes to your records (instead of going through GAGEtrak's normal data entry screens). When you open it, the Edit All Tables menu will appear; you can choose from the following data tables:

- **Calibration Header**
- **Calibration Measurement**
- **Calibration Result Codes**
- **Calibration Standards**
- **Field Labels**
- **Gage Master**
- **Gage Procedure Links**
- **Gage RR Links**
- **GRR Results Header**
- **GRR Results Measurements**
- **Issue Tracking**
- **Part Record**
- **Procedures**
- **Search Criteria**
- **Service Request**
- **Service Request Letter**
- **Skip Dates**
- **Standard Group**
- **Standard Group Header**
- **Status**
- **Supplier Records**

Warning: When editing data from this utility, you are working directly with the tables in your database—none of the GAGEtrak features that protect against data entry errors or relational integrity corruption are in place. Please be **extremely cautious** when using this feature.

Data Tools - Remove Spaces from Gage IDs

Run this utility once after you've imported data from any other gage management program. This utility removes any unnecessary trailing spaces that your old program used and that were in any databases that you imported into GAGEtrak. It also rounds your calibration measurements to six decimal places, removing any extraneous digits added or transferred during the import process. Depending on how many records you have, this process can take from one to ten minutes.

> **Note: This utility is not the same as the GAGEtrak Compact Data utility. The Compact utility doesn't remove *spaces*; it removes old, deleted *records* that you no longer need.**

Data Tools - Reset Gage Issue Status

This utility goes through each gage in the database and checks to see if the gage has been issued and not returned. All of the currently issued gages are flagged as issued. Use this utility if any issue tracking records have been deleted.

Data Tools - Set Format of Standards

Use this utility if you have upgraded from any previous version of GAGEtrak. It sets the number of significant decimals for the calibration standards for each gage according to each gage's most precise tolerance or resolution.

Data Tools - Set Status of Gages

This procedure updates the Gage Entry Status field for *all* records to which you haven't assigned a status. It changes these empty Status fields to status 1 (Active). This utility won't change the status of any gages in your database that already have a status.

> **Note: Use this utility only if you're upgrading from a 1.x version of GAGEtrak or if you imported data from another program or file format. If you're upgrading from a 1.x version of GAGEtrak, run this utility after the Data Transfer Utility (see *Appendix A*).**

Chapter 7: Customizing Reports

This Customizing Reports chapter is an overview of how to work with the Custom Reports module. For a comprehensive Report Editor User's Manual, visit *http://www.cybermetrics.com/CustomReport.asp* to download a complimentary guide.

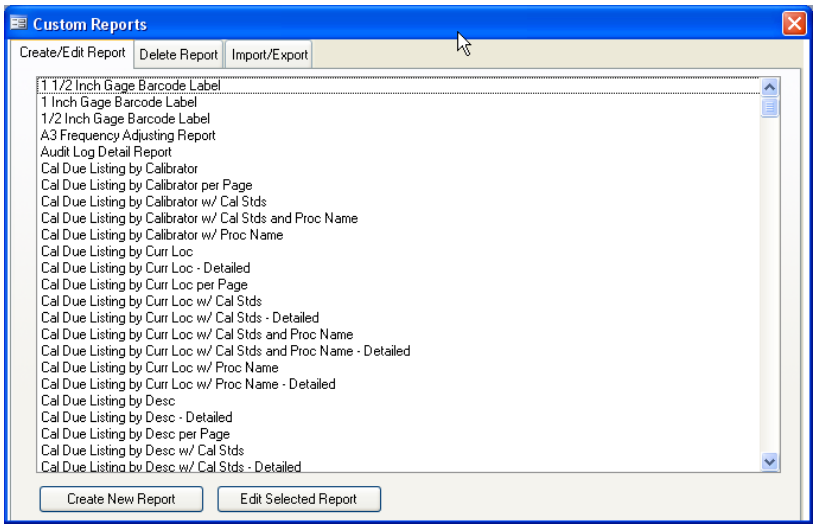
GAGEtrak 6.7 now offers the ability to manipulate your reports. You can create new reports or edit existing reports, import reports from other compatible databases, or export reports. You can also delete reports from the Custom Report list that are no longer in use.

The Report Editor design environment describes how to add and modify controls in your report. It includes detailed descriptions of Report Editor user interface elements, including menus and toolbar items and preference settings. In addition, you will learn about some basic operations while using the Report Editor, such as selecting and moving, formatting and aligning controls in your report.

Note: For complex custom report design users must have knowledge of basic VB Scripting and of Data Dynamic Objects, variables and report events in order to successfully program with the Report Editor.

Using Custom Reports

Custom Reports is a new utility in the Setup section of GAGEtrak 6.7. To start, click on the Custom Reports button; the window below will appear:


Custom Reports
Create/Edit Report
Delete Report
Import/Export
1 1/2 Inch Gage Barcode Label
1 Inch Gage Barcode Label
1/2 Inch Gage Barcode Label
A3 Frequency Adjusting Report
Audit Log Detail Report
Cal Due Listing by Calibrator
Cal Due Listing by Calibrator per Page
Cal Due Listing by Calibrator w/ Cal Stds
Cal Due Listing by Calibrator w/ Cal Stds and Proc Name
Cal Due Listing by Calibrator w/ Proc Name
Cal Due Listing by Curr Loc
Cal Due Listing by Curr Loc - Detailed
Cal Due Listing by Curr Loc per Page
Cal Due Listing by Curr Loc w/ Cal Stds
Cal Due Listing by Curr Loc w/ Cal Stds - Detailed
Cal Due Listing by Curr Loc w/ Cal Stds and Proc Name
Cal Due Listing by Curr Loc w/ Cal Stds and Proc Name - Detailed
Cal Due Listing by Curr Loc w/ Proc Name
Cal Due Listing by Curr Loc w/ Proc Name - Detailed
Cal Due Listing by Desc
Cal Due Listing by Desc - Detailed
Cal Due Listing by Desc per Page
Cal Due Listing by Desc w/ Cal Stds
Cal Due Listing by Desc w/ Cal Stds - Detailed
Create New Report
Edit Selected Report

Create/Edit Report

The Create/Edit Report tab displays a list of all available reports. From this tab, you can open the report editor in one of two ways: you can select the title of a report in the listing and click the Edit Selected Report button to open the selected report for editing, or you can click Create New Report to create a report completely from scratch.

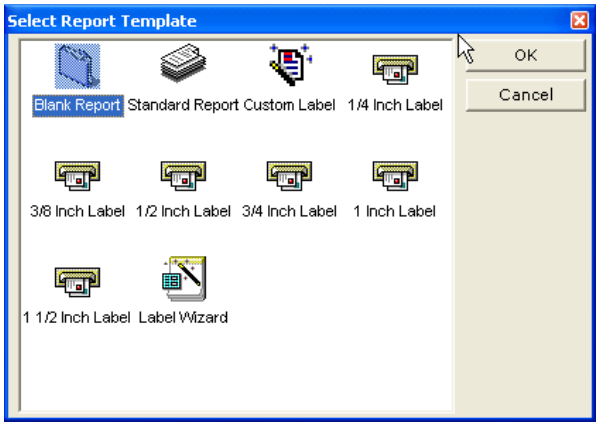
For you to better understand the report editor canvas, we'll start with a blank report and discuss each of the elements of the canvas.

Creating a New Report

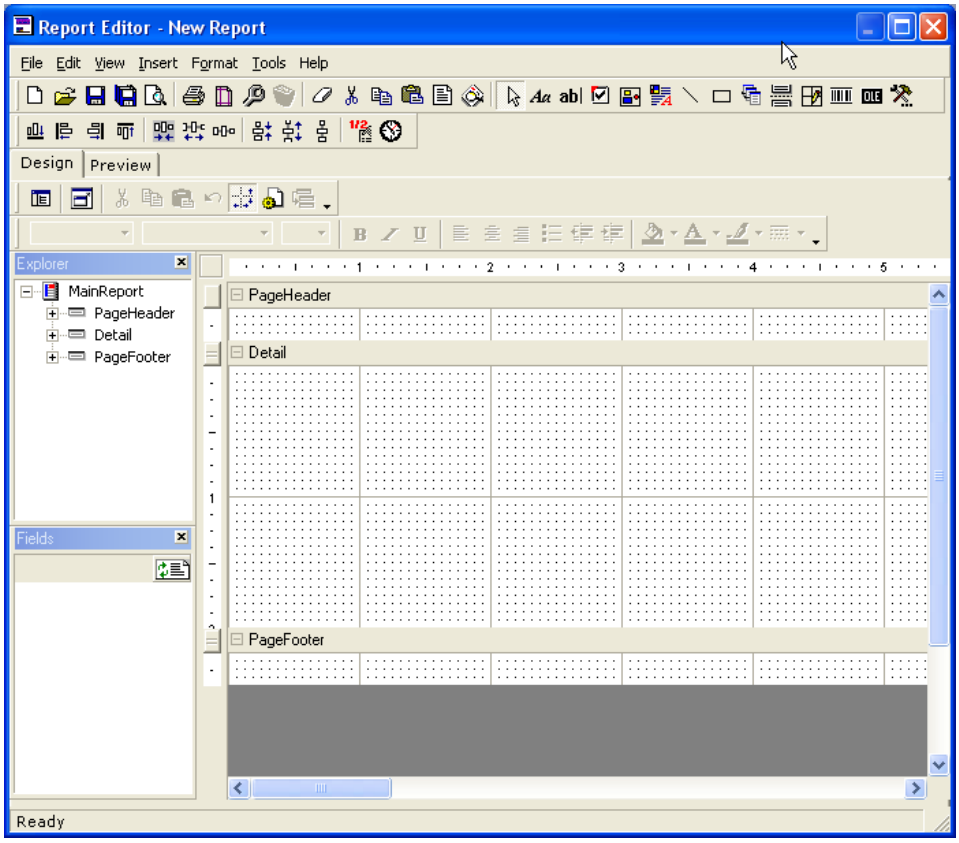
GAGEtrak 6.7's report editor comes with templates to help you build reports. If you have a label printer, using the most common label formats will fast-track your label design. You may also use the Label Wizard to develop new label designs quickly.

The report editor screen is common to all the templates. For our purposes, we will base our discussion on a basic blank report and build as we move along. Towards the end of the discussion, we will touch on the Label Wizard as a review of what we've learned.

When you click the Create New Report button, the window below will appear:

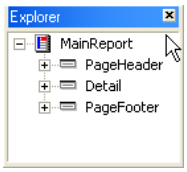


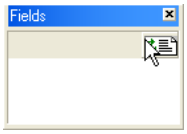
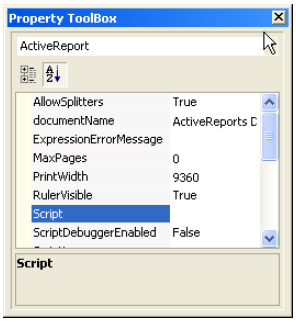
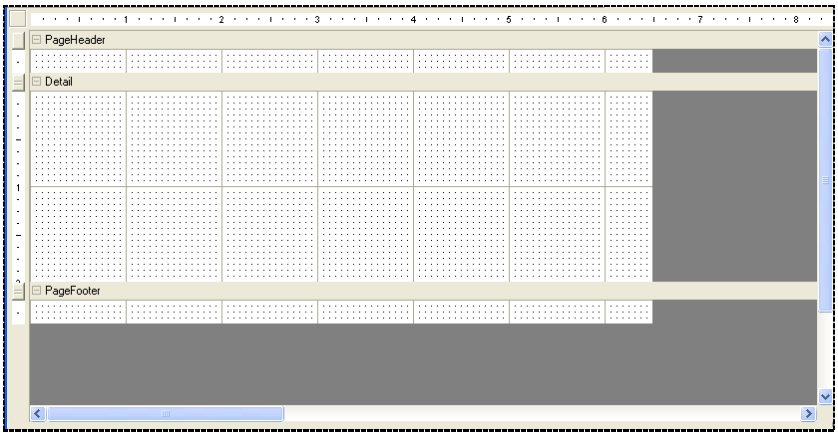
Select Blank Report and click on the OK button.



User Interface

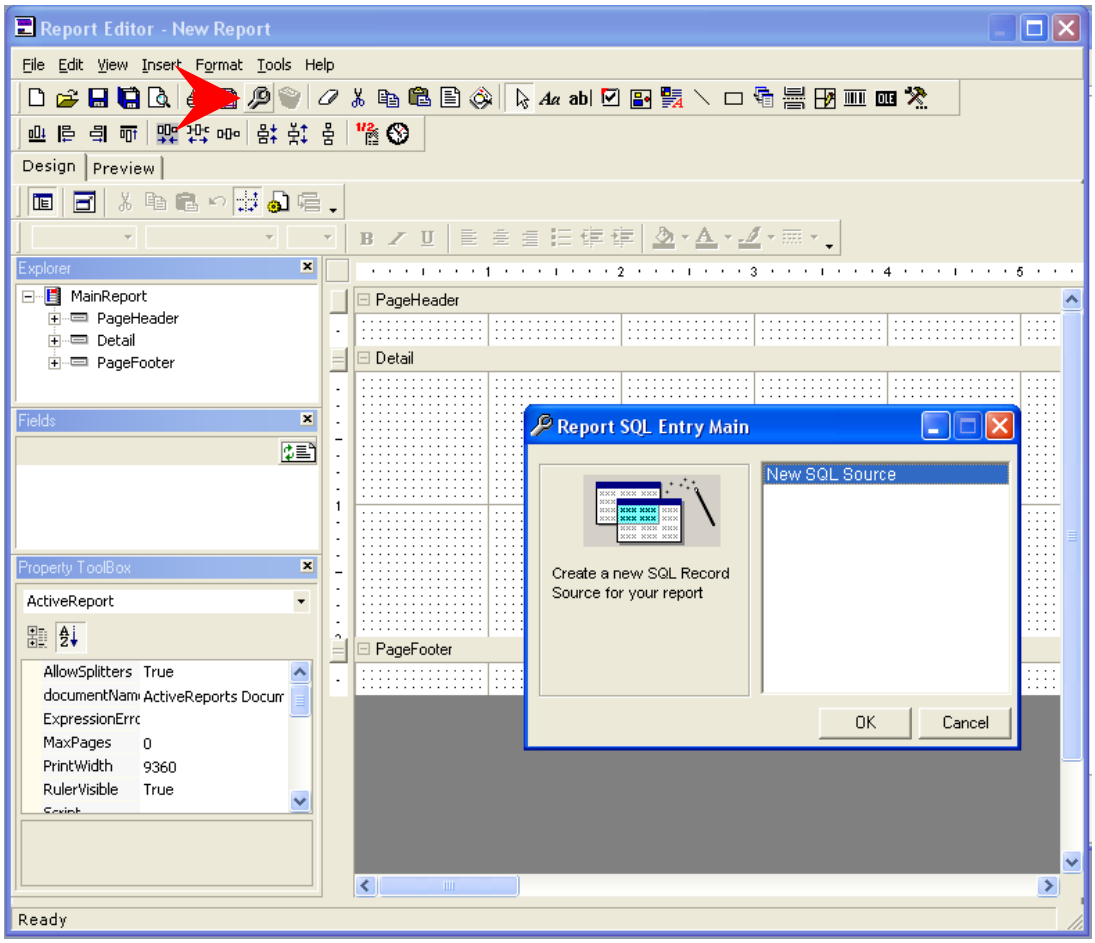
The editor window is divided into four parts: Explorer (or Objects), Fields, Property Toolbox, and the Designer Canvas.

Frame Title	Description
Explorer	This Explorer window shows you a tree diagram of the different parts of your report designer canvas. Click on any item to display its properties in the Property Toolbox. 

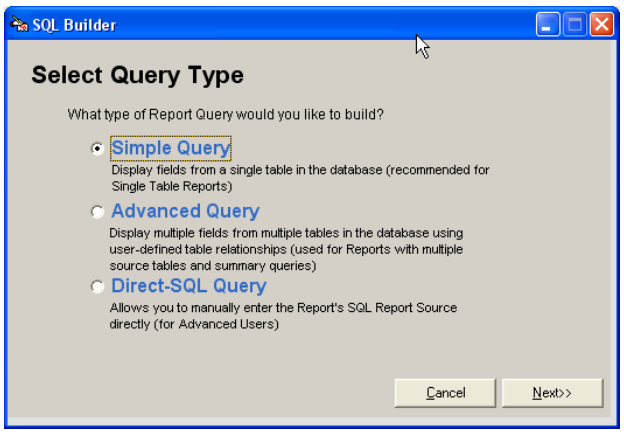
Frame Title	Description
Fields	If you have established a database connection, all available fields will appear in this frame. You can then select any field and it to the designer canvas on the right. 
Property Toolbox	Lists the properties of the control when selected in the Explorer frame or on the designer canvas. The properties displayed vary depending on the object selected. 
Designer Canvas	The canvas can be divided in different parts. The example shows a page header, the details section and page footer. After building your format, you can preview the outcome by selecting the **Preview** tab. 

Opening a Data Source

When you create a report, you must first connect to a data source. The fields for your report will come from this data source. On the toolbar, select the button labeled Set or Build SQL Source for the Report as shown:



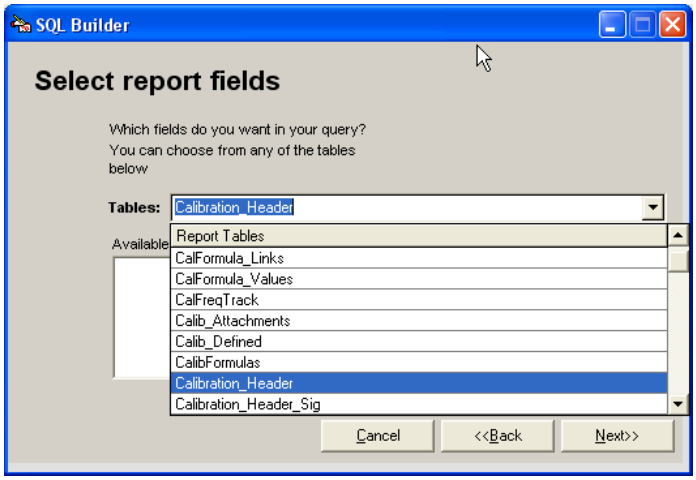
The Report SQL Entry Main window will appear as shown, with New SQL Source selected. This is the only way you can make a connection to a data source, so you must click OK to proceed. The SQL Builder dialog box appears, giving you three types of queries to choose from.


SQL Builder
Select Query Type
What type of Report Query would you like to build?
Simple Query
Display fields from a single table in the database (recommended for Single Table Reports)
Advanced Query
Display multiple fields from multiple tables in the database using user-defined table relationships (used for Reports with multiple source tables and summary queries)
Direct-SQL Query
Allows you to manually enter the Report's SQL Report Source directly (for Advanced Users)
Cancel
Next>>

The first two selections use a query wizard guiding you easily through the process. For the third selection, you must know the syntax used to create SQL commands.

Simple Query

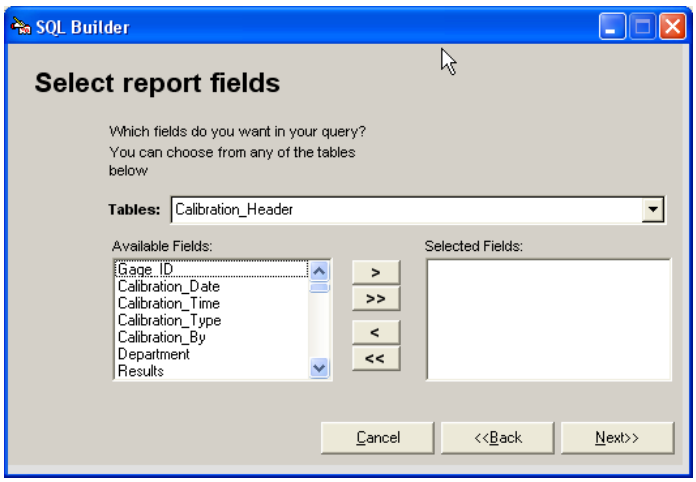
If you only have one data source—that is, only one table to use for your report— choose Simple Query. First, identify the table you wish to use as your data source. To do this, click on the list box on the right-hand side of the Tables field and select from the list of available tables in your database; if you know the table name you can type it directly into the provided field.



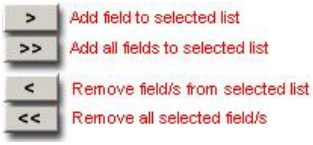
Selecting a Table and Choosing Fields

When a table has been selected, in this case the Calibration_Header table, the list of available fields for the table will appear on the Available Fields list box. You can now select the fields you want to appear in your report by clicking on their names in the list. You can

select more than one field at a time; if you select a field by mistake, you can unselect it by clicking on the field name again.



Now click on the selection buttons between the listing fields to move the fields you have highlighted to the SELECTED FIELDS list box to the right. This places the fields in your report.



Add field to selected list

Add all fields to selected list

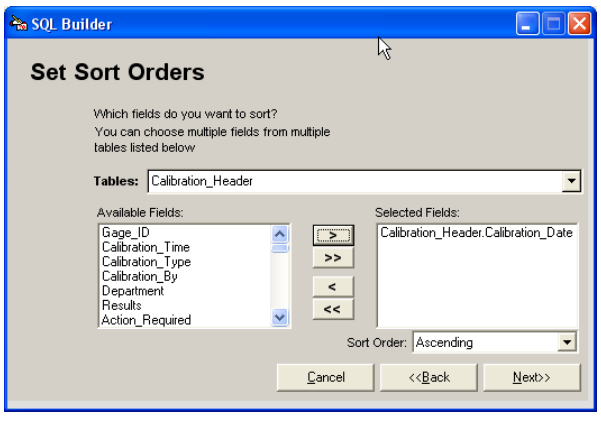
Remove field/s from selected list

Remove all selected field/s

When you are satisfied with your selection, click on the Next button.

Setting Sort Order

To set the order or arrangement of data in your report, you have to specify which table and what field will determine this order.



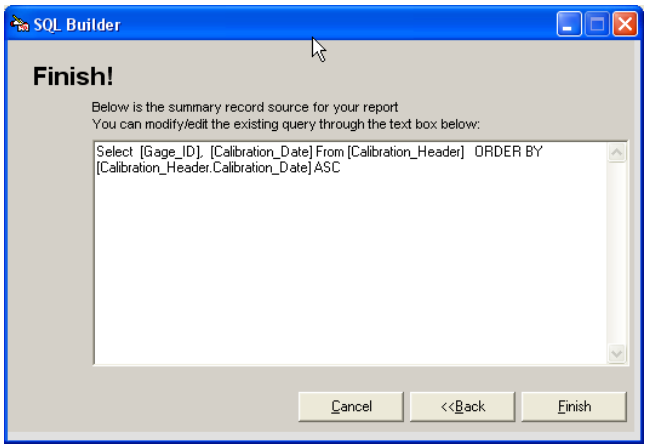
You can, however, choose not to apply any particular order on your records within the Selected Fields list box; if you do not, your report will display them as they appear in your

original records. You must also set the *Sort Order* to *Ascending* or *Descending*. If no setting is specified the application default is set to *Ascending*.

Click on the Next button and view the SQL statement summary on the next window. The following summary screen will show you the actual SQL statement that will be used to open your data source.

The SQL Statement

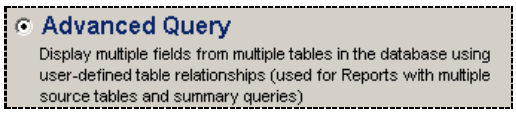
This text box contains the actual SQL statement the program will use to get the data source for your report.


SQL Builder
Finish!
Below is the summary record source for your report
You can modify/edit the existing query through the text box below:
Select [Gage_ID], [Calibration_Date] From [Calibration_Header] ORDER BY [Calibration_Header.Calibration_Date] ASC
Cancel
<<Back
Finish

You can modify the query by editing the text in this window, if you know the right syntax for creating SQL statements; however, if you do not do this correctly, an error message will appear. We recommend that users *do not* edit the SQL statement displayed in this window. When you are done, click on the Finish button.

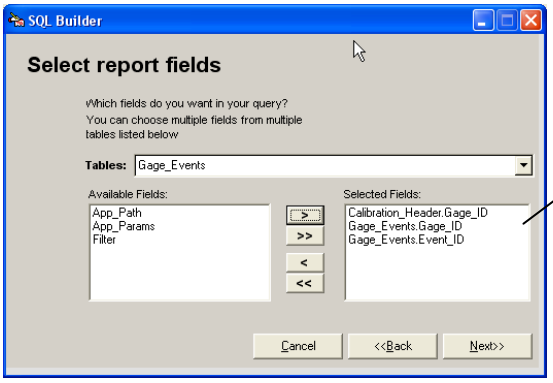
Advanced Query

When creating reports using multiple tables, use this query type. You will be able to use the fields from different tables you select; the tables are connected by links you create or specify. It is very important that you know the structure of your tables and the types of the fields in these tables. You cannot create links using two different kinds of fields (e.g., a text field displaying the gage ID number cannot be linked to a date field showing the calibration date). These linked fields should be common to both tables. If you are not sure about this, ask your database administrator about the properties of your tables. In the Select Query Type window, select the Advance Query button and click on Next.


Advanced Query
Display multiple fields from multiple tables in the database using user-defined table relationships (used for Reports with multiple source tables and summary queries)

Selecting Tables and Fields

Follow step 2 just as you did with the Simple Query to select your table name and field names. Once you have selected fields from one table, you can choose another table and add fields from that table to your Selected Fields list.

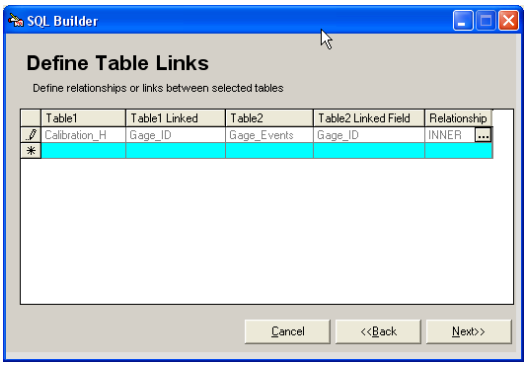


In the Selected Fields listing, the string of characters before the period indicates the table name; the string after the period indicates the field name. Take note that you have two different tables for the Selected Fields

Fields that you will use to link your tables need not be included in the Selected Fields list. We do suggest that you link fields coming from the table where all the records are to be included in the report. For example, you have a table of gage calibration records which does not include details of each gage and another table listing the details for all the gages. For a certain period of time not all gages are to be included in the filtered table. If you want a report that will include all the filtered gages with its corresponding gage descriptions, you will need to link to both tables, for instance, link to the Gage ID. In this case, not all descriptions will be used.

Establishing Table Links

After selecting your report fields from different tables, you should now establish the link or links between the tables so as to keep information on a specific record together. Define these links by specifying the tables and the fields that will be linked and the type of link to use.



You link two tables at a time through their common field (it is not necessary that the fields have the same name; it is necessary that they be of the same type: e.g. GageID and Gage_ID).

The table and linked fields have drop-down lists limited to your selected table and the fields of the table. A relationship selection window is also provided to guide you.

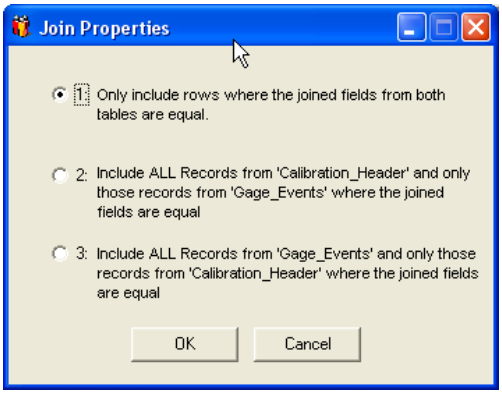

Join Properties
1: Only include rows where the joined fields from both tables are equal.
2: Include ALL Records from 'Calibration_Header' and only those records from 'Gage_Events' where the joined fields are equal
3: Include ALL Records from 'Gage_Events' and only those records from 'Calibration_Header' where the joined fields are equal
OK
Cancel

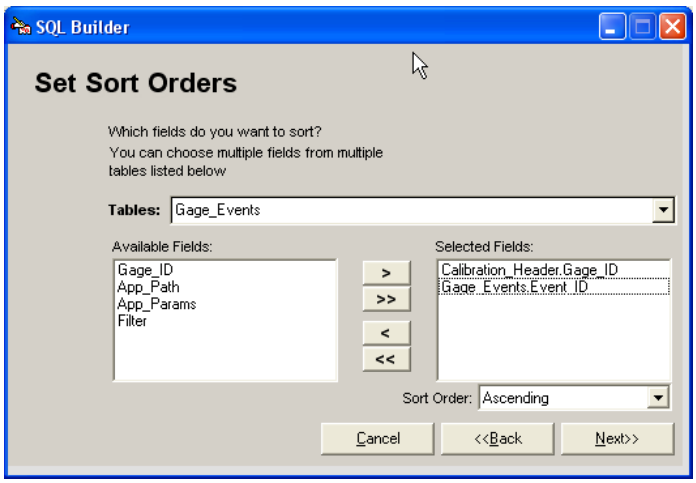
Table link fields

Field Name	Description
Table 1	Name of the table in which all its records are to be reflected in the report. "All records" may mean all records subjected to filter, if any. Links may also act as filters. This field has a list box.
Table 1 Linked Field	This is a field common in type and contents between the two linked tables. The names and field sizes may vary but it will only link with exactly the same record. This field has a list box.
Table 2	Name of the table linked with Table 1. Not all its records (even if subjected to filter) will be included in the report.

Table 2 Linked Field	Same description as *Table 1 Linked Field*.
Relationship	There are three types of relationship as described in the illustration. It is a good practice to use the conventions described for *Table 1* and *Table 2* above, but these two tables can actually be interchanged as described in selection 2 and 3 of the Join Properties option.

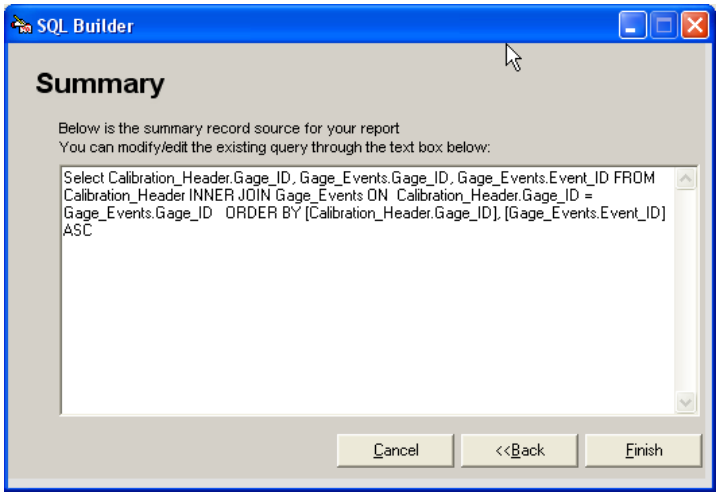
Setting Data Sort Order

To set the order or arrangement of data in your report, you have to specify which table and what field will determine this order.



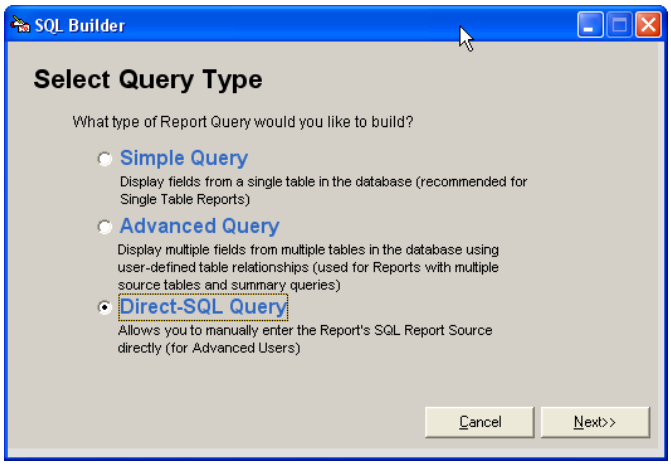
You can, however, choose not to apply any particular order on your records within the Selected Fields list box; if you do not, your report will display them as they appear in your original records. You must also set the Sort Order to Ascending or Descending. If no setting is specified the application default is set to Ascending.

Click on the Next button and view the SQL statement summary on the next window. The following summary screen will show you the actual SQL statement that will be used to open your data source.

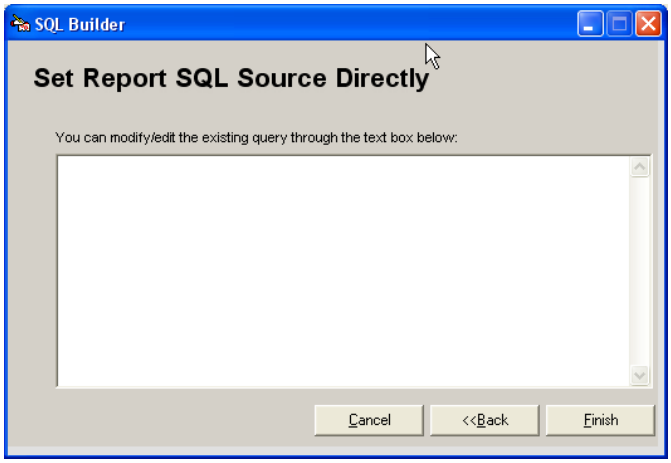

SQL Builder
Summary
Below is the summary record source for your report
You can modify/edit the existing query through the text box below:
Select Calibration_Header.Gage_ID, Gage_Events.Gage_ID, Gage_Events.Event_ID FROM Calibration_Header INNER JOIN Gage_Events ON Calibration_Header.Gage_ID = Gage_Events.Gage_ID ORDER BY [Calibration_Header.Gage_ID], [Gage_Events.Event_ID] ASC
Cancel
<<Back
Finish

Direct-SQL Query

Advanced users can directly enter the SQL statement using this third type of query preparation. It is assumed that you know the full syntax for creating SQL statements. We have, however, included the basics for creating SQL statements or statement structure to help you get started.


SQL Builder
Select Query Type
What type of Report Query would you like to build?
Simple Query
Display fields from a single table in the database (recommended for Single Table Reports)
Advanced Query
Display multiple fields from multiple tables in the database using user-defined table relationships (used for Reports with multiple source tables and summary queries)
Direct-SQL Query
Allows you to manually enter the Report's SQL Report Source directly (for Advanced Users)
Cancel
Next>>

Clicking on the Next button will give you a window with a blank input field as shown below:



The Report Editor uses the Microsoft Jet database engine —a database management system that stores and retrieves data in user and system databases. The Microsoft Jet database engine can be thought of as a data manager component with which other data access systems, such as Microsoft Access and Visual Basic, are built.

The `SELECT-SQL` statement is used to set up your data source. A brief syntax explanation is shown below. It instructs the Microsoft Jet database engine to return information from the database as a set of records.

Syntax

```
SELECT [predicate] { * | table.* | [table.]field1 [AS alias1] [, [table.]field2 [AS alias2]
[, ...]]}
FROM tableexpression [, ...] [IN externaldatabase]
[WHERE... ]
[GROUP BY... ]
[HAVING... ]
[ORDER BY... ]
[WITH OWNERACCESS OPTION]
```

The `SELECT` statement has these parts:

Part	Description
predicate	One of the following predicates: **ALL, DISTINCT, DISTINCTROW**, or **TOP**. Use the predicate to restrict the number of records returned; if none is specified, the default is **ALL**.
*	Specifies that all fields from the specified table or tables are selected.
table	The name of the table containing the fields from which records are selected.
field1, field2	The names of the fields containing the data you want to retrieve. If you include more than one field, they are retrieved in the order listed.

Part	Description
alias1, alias2	The names used as column headers instead of the original column names in the table.
tableexpression	The name of the table or tables containing the data you want to retrieve.
externaldatabase	The name of the database containing the tables in **tableexpression,** if they are not in the current database.

Remarks

To perform this operation, the Microsoft Jet database engine searches the specified table or tables, extracts the chosen columns, selects rows that meet the criterion, and sorts or groups the resulting rows into the order specified.

The minimum syntax for a SELECT statement is:

```
SELECT fields FROM table
```

You can use an asterisk (*) to select all fields in a table. The following example selects all of the fields in the Supplier_Master table:

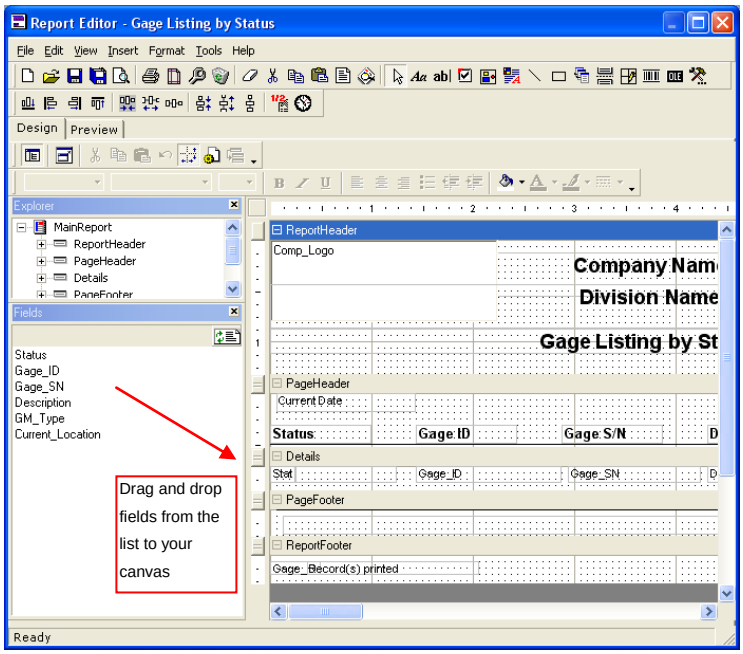
```
SELECT * FROM Supplier_Master;
```

If a field name is included in more than one table in the FROM clause, precede it with the table name and the . (dot) operator. In the following example, the Gage_ID field is in both the Calibration_Header table and the Gage_Events table.

```
Select Calibration_Header.Gage_ID, Gage_Events.Gage_ID,Gage_Events.Event_ID
FROM Calibration_Header INNER JOIN Gage_Events
ON Calibration_Header.Gage_ID =Gage_Events.Gage_ID
ORDER BY [Calibration_Header.Gage_ID], [Gage_Events.Event_ID] ASC
```

Creating Your Layout

Now that you have provided a source for your report you can now start creating your layout. Note that the Fields frame is no longer empty. It now contains a list of fields that you can drag and drop onto your report canvas.



You link two tables at a time through their common field (it is not necessary that the fields have the same name; it is necessary that they be of the same type: e.g. GageID and Gage_ID).

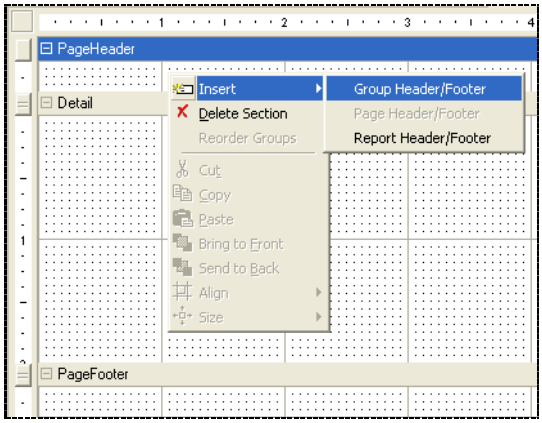
You can drag as many fields as you can put into your canvas, but remember that the canvas working area is the actual edge-to-edge size of your printing paper. Also, the top of the Page Header and the buttom of the Page Footer mark the upper and lower edges of your paper. You can move the blue markers on the ruler bar to your desired edge margin; this will be marked by the red dotted line running from the top to the bottom of the page.

The basic report format has three sections: Page Header, Detail, and Page Footer. The Header and Footer sections appear on every page of your report while the Detail section contains the body of the report.

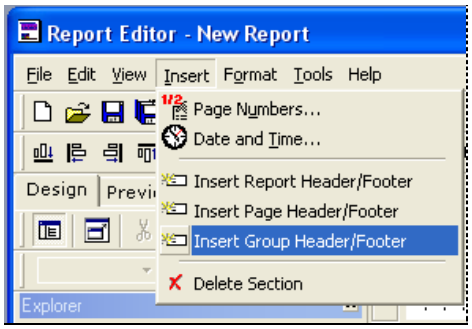
Grouping Your Data

Some reports require grouping of data – common record information is printed on one row and rows below include other varying details of the records. For example, in creating a report on the studies done on gages, a group header would contain the ID number of the gage and the rows beneath would contain the type of studies done for the particular gage.

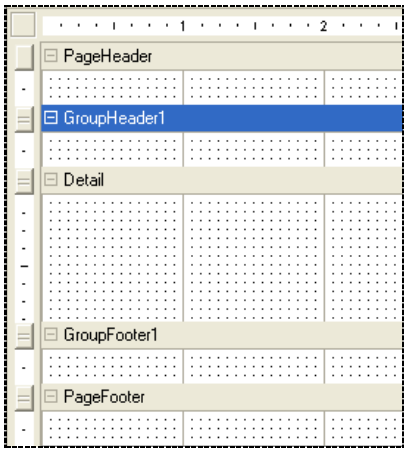
To create a group, right-click anywhere in the designer canvas and select Insert Group Header/Footer from the popup menu.



You can also use the Insert menu from the main menu bar and select Insert Group Header/Footer.

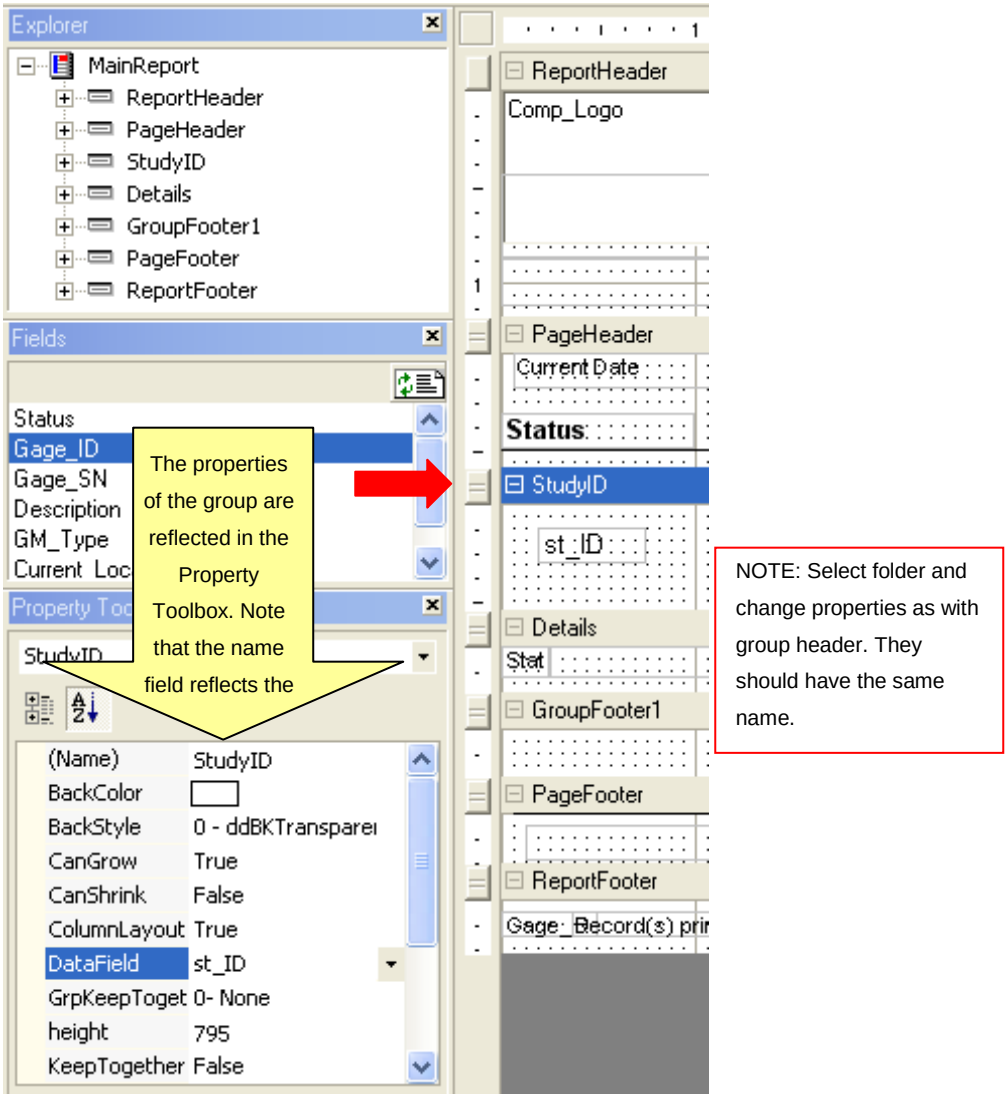


A new section on the canvas will appear – a group header and corresponding group footer, appropriately labeled.



The default labels are GroupHeaderN and GroupFooterN, where N is an integer from 1 onwards.

The name and other properties of the group can be changed in the properties frame on the left, after selecting the data field you will group on. If you know the name of the field, you can type it directly in the field, or choose from the drop-down list of available fields. It is also advisable to change the group header and corresponding group footer name to the name of the field you group on. This change will be reflected in the header and footer names on the canvas. You can add as many groups as you wish.

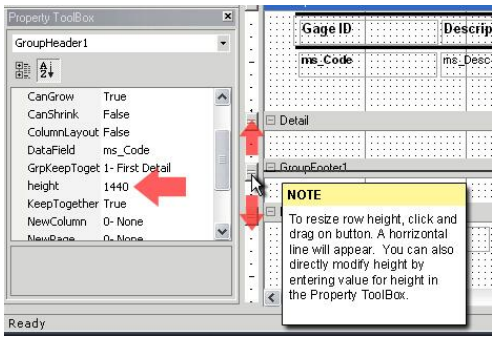


To add a field to your group, just drag and drop the field from the Fields frame. Just make sure that you include the field defining the group. The information on the fields that you put here will be only of the first record for the particular group.

Creating the Details

As mentioned above, you can drag and drop as many fields from the Fields frame as you can fit on the designer canvas Details section. The Details section should be based on the paper prototype you have developed prior to using the graphics tool. You can modify the row height of the section by dragging the button to the left of the row header below the Details section up or down.

You can also directly change the row height by entering a value in the Height property in the Properties-Details frame. The unit used in the program is the twip. There are 20 twips per printer's point, or 1440 per inch.



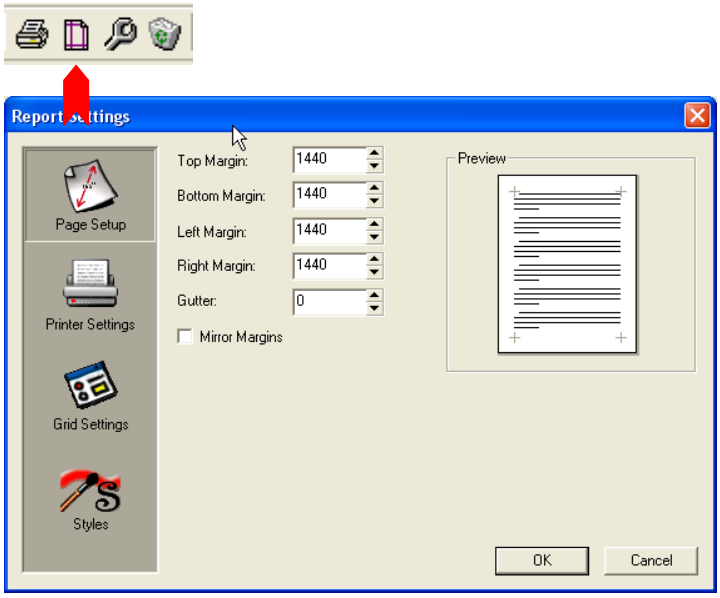
TWIP

By default, all movement, sizing, and graphical-drawing statements use a unit of one **twip**. A twip is 1/20 of a printer's point (1,440 twips equal one inch, and 567 twips equal one centimeter). These measurements designate the size an

A third way of resizing the row height is by putting the cursor on the bottom of the row you wish to resize. The cursor appearance will change to this symbol ↕ and can then be dragged up or down depending on the section size requirement.

Report Settings

Report Settings lets you set margins, printer settings, grid settings and styles used in building reports. From the main icon bar, select the Report Setup button to open the Report Settings window.



Converting from Inches or Centimeter to Twips

INCHES

Margin = 1440 x n

CENTIMETERS

Margin = 567 x n

Where n is your desired

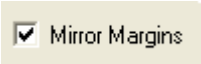
Page Setup

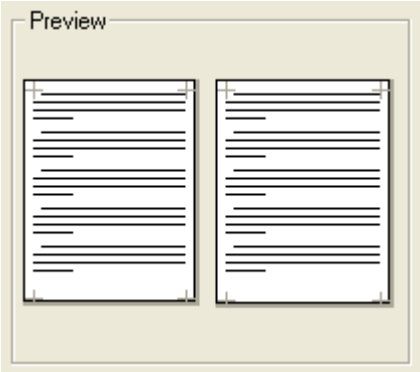
The margin is the nonprinting area outside the main body of your report; by default, margins in the report editor are set to 1440 twips (1 inch) all around. If you prefer a wider or narrower margin, click on the up or down arrow next to the field (Top Margin, Bottom Margin, Left Margin, or Right Margin) you wish to adjust. Clicking on the up arrow will add 365 twips, or ¼", to the width of the margin; clicking on the down arrow will subtract a similar amount from the width of the margin. You may also enter a value manually; if you want a 5/8" bottom margin, for instance, multiply 1440 twips/inch by .625". Enter the resulting value, 900, in the Bottom Margin field.

The gutter is an additional area you can add to your inside margin width, increasing the nonprinting area of your document. (If you expect to print reports that will be bound in a ring binder, you might want to add a gutter of ¼" to ½" to allow for holes to be punched). Click on the up or down arrows to increment this value by 365 twips (¼") or enter a value manually as desired.

If you are printing on the front and the back of a page and your left and right margins are different (or if you have added a gutter to your pages), you will probably want to check the

Mirror Margins checkbox. Checking this box automatically sets your margins so that the inside margins of facing pages are the same, and the outside margins as well, just as if they were reflected in a mirror. (When you check this box, the margin display changes from a single right-hand page to two facing pages with mirrored margins).

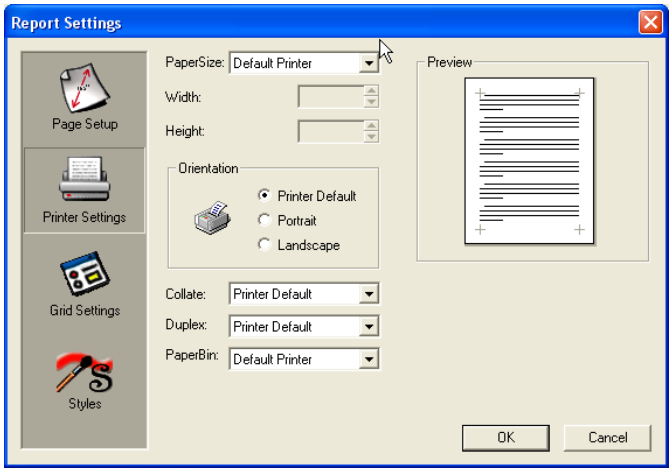




Printer Settings

By default the program follows the default settings of the printer. These settings can be found in the Properties setting of the printer in the Windows® printer setup. For your report setup convenience, we have added a facility within the report editor to modify these settings.

To access Printer Settings, select the Printer Settings icon in Report Settings. The window shown below will appear:

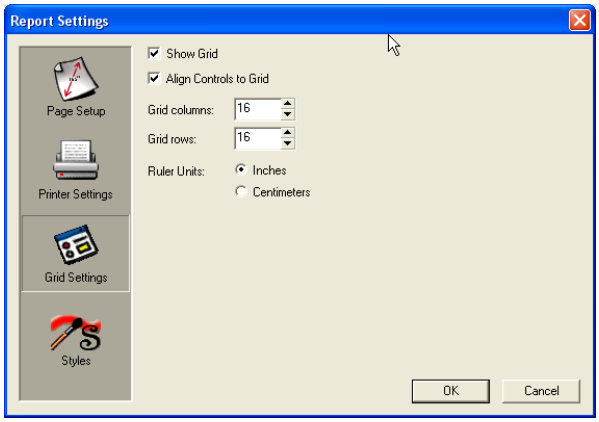


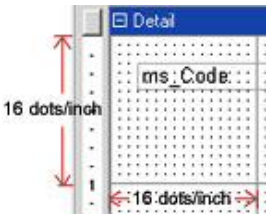
Field Name	Description
Paper Size	This list box shows the paper sizes your default printer can handle. It is best to view your selection and set this option before you create a report to ensure that your report falls within the boundaries of your page setup. Most printers have default margins or nonprintable edges. Consult your printer manual to determine these settings.
Width and Height	Width and height are specified in twips. Divide this value by 1440 to convert to inches; divide by 567 to convert to centimeters.
Orientation	If you select Printer Default, check this setting in your Printer Control Panel. The other settings are Portrait and Landscape. In portrait orientation, the page is oriented vertically; in landscape it is oriented horizontally. When you change these settings, the page preview icon will change to give you a visual representation of the result.
Collate	Select Collate when you are printing several copies of a multi-page report to print each report sequentially. When Don't Collate is selected, all copies of page 1 will be printed, then all copies of page 2 will be printed, and so on.
Duplex	If your printer offers duplex printing, you can choose this option to print automatically on both sides of the paper. Not all documents need to be printed in this manner, so we have included this setting to be activated only when printing reports.
Paper Bin	If your printer has more than one paper bin, you can use this option to select a specific paper bin. You might use this option to print on paper of a different size than the printer's default, or to print on letterhead as opposed to blank paper.

Grid Settings

The tiny dots you see evenly distributed over the designer canvas are the grid, which is intended to give you guidance in the design and layout of your report. The dots will not appear on your printed report.

The spacing of the dots in rows and columns is defined under Grid Settings. By default, there are 16 dots to the inch both horizontally and vertically.





By default, the Show Grid checkbox is checked. Uncheck this box to hide the grid. Check the Align Controls to Grid checkbox if you want the elements on the designer canvas to snap to the grid.

Note: Sometimes you may want to uncheck this option to position elements closer together than your grid will allow. Do not forget to recheck this option if you want the elements on the designer canvas to snap to the grid.

Grid settings can be changed to suit your requirements. Use the Grid columns and Grid rows fields to specify how many dots per ruler unit are desired; use the Ruler Units radio buttons to specify the unit of measurement in inches or centimeters.

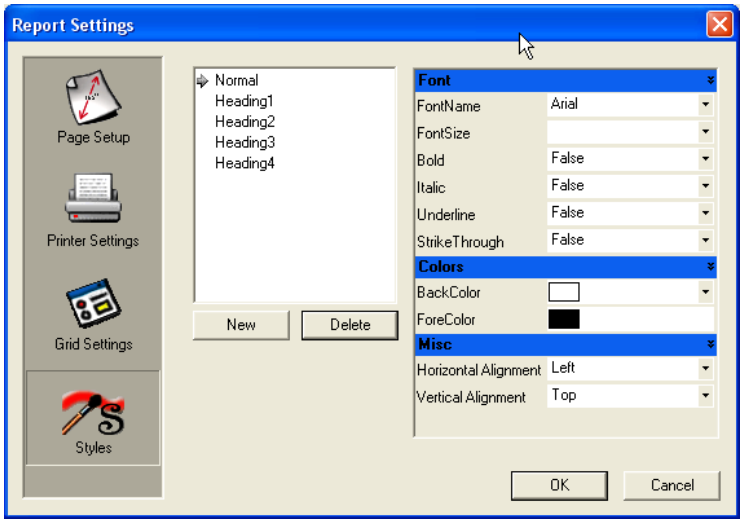
Note: If you change your grid unit to centimeters, you may want to reduce the number of dots per ruler unit to 10 or even 5 to keep your canvas from being overcrowded with grid dots.

Styles

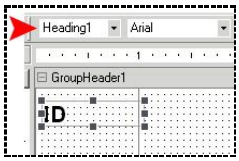
This feature gives you a quick way to style the type in your reports appropriately and uniformly. Four basic styles are included for your convenience: Normal, Heading 1, Heading 2, and Heading 3. Each of these styles has different attributes according to how they might be used in a document; for instance, the heading styles are all bold for emphasis, while the style Normal is plain rather than bold and of a suitable size for body text on a page. You might want to style the most important elements in a report Heading 1, less important headings Heading 2, the least important headings Heading 3, and body content Normal.

You may use the controls in the right-hand pane of the Styles window to modify the font, size, color, or alignment of a style. You may also create new styles by clicking the New button under the list of styles in the Styles window.

Note: New styles, or modifications to existing styles, in a given report appear *only* in that report.



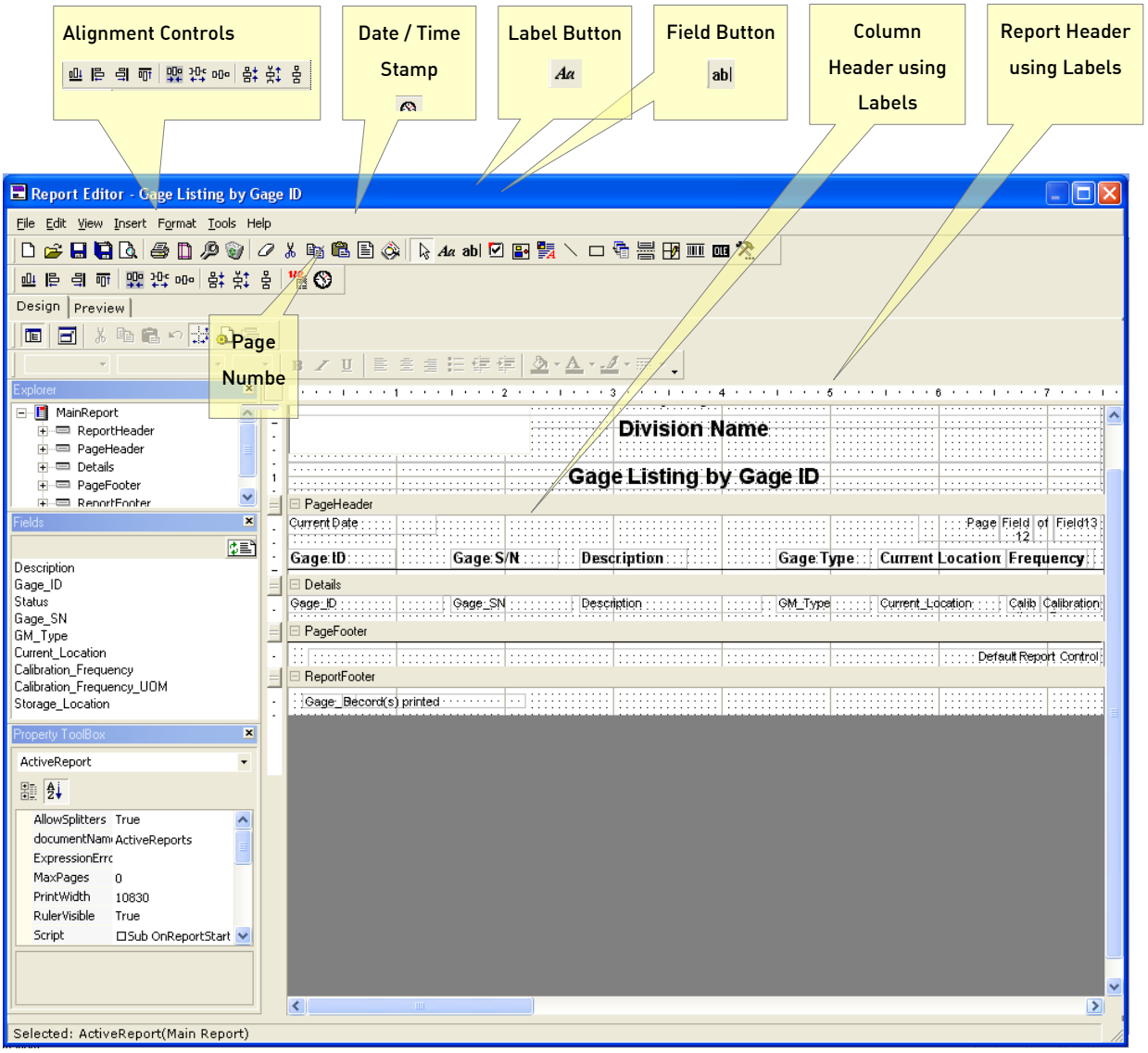
To apply a text style to an element in the designer canvas, select it, then choose the desired style from the drop-down list at the top left of the window just above the ruler.



Completing Your Report Layout

Every report must have a page header and footer. The page header contains the heading for each field of the report, i.e., report date and perhaps a page number. The footer usually contains the page number and subtotals of the value fields in the report. You can create titles and field labels using the label button; the report editor also includes buttons that generate automatic page numbers and a date-time stamp.

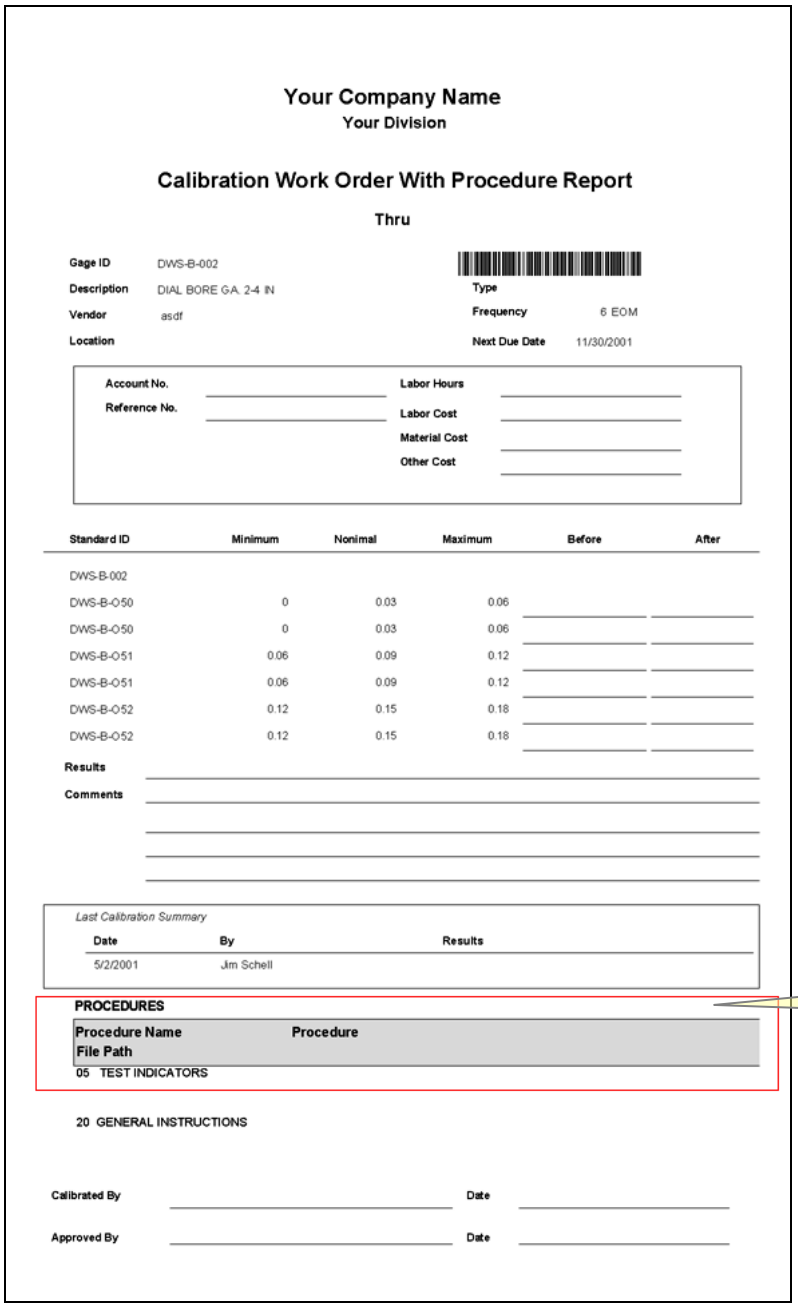
Note: The Report Editor does not save your report automatically, so when you are done with the report layout, do not forget to save your report! This can be done from the file menu option File | Save, **or with the** Save **button located on the icon menu with a disk as an image.**



The other buttons are self-explanatory; we will discuss the other special buttons in greater detail as we go along. Feel free to explore.

Sub-Reports

A sub-report is a report within a report– each sub-report pertains to a record in the main report. Sub-reports are very handy when you want to include details into your report but cannot include additional tables for the details in the main SQL statement.



Your Company Name
Your Division

Calibration Work Order With Procedure Report

Thru

Gage ID DWS-B-002
Description DIAL BORE GA. 2-4 IN
Vendor asdf
Location
Type
Frequency 6 EOM
Next Due Date 11/30/2001

Account No.
Reference No.
Labor Hours
Labor Cost
Material Cost
Other Cost

Standard ID	Minimum	Nominal	Maximum	Before	After
DWS-B-002					
DWS-B-050	0	0.03	0.06		
DWS-B-050	0	0.03	0.06		
DWS-B-051	0.06	0.09	0.12		
DWS-B-051	0.06	0.09	0.12		
DWS-B-052	0.12	0.15	0.18		
DWS-B-052	0.12	0.15	0.18		

Results
Comments

Last Calibration Summary

Date	By	Results
5/2/2001	Jim Schell	

PROCEDURES

Procedure Name File Path	Procedure
05 TEST INDICATORS	

20 GENERAL INSTRUCTIONS

Calibrated By Date
Approved By Date

Sub-report of procedures attached to each gage record.

A great deal of planning is needed when building reports and considering the addition of sub-reports. Sometimes you can include the data in your master data source (SQL Query) and just create sub-groups for this data. However, when your report format requires large amounts of detail, as

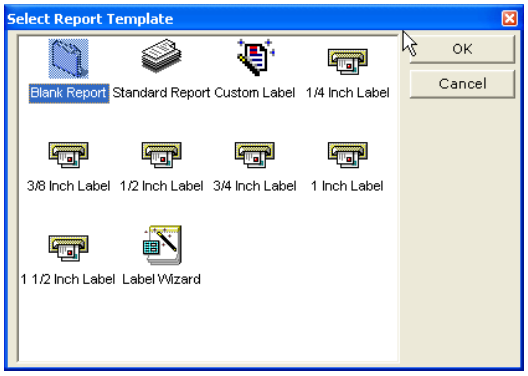
Link fields are very critical. They must be of the same type–they may not have the same name but should have the same content. However, here we have made sure that fields of the same name have the same type of data. Also, primary key fields (common fields with unique

Sub-reports are designed in a separate design canvas and then linked into the main report document. You must make sure that it contains a least one field that is common with the table you are linking it to (contents and type). The beauty of sub-reports is that they can be

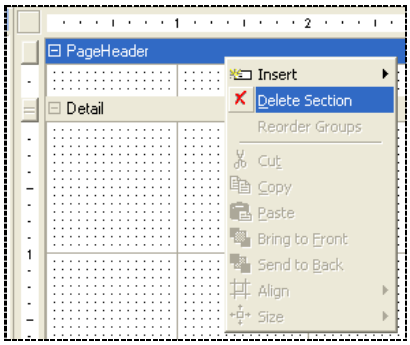
used over and over again in different reports, so what you design once can be used many times.

Creating a Sub-Report

Creating sub-reports is much like creating any other report: click on Custom Reports under Setup, then click on the Create New Report button to view the template list in Select Report Templates. Select Blank Report and click on OK. A new blank report designer canvas is now ready for your report. Open a data source as described in *Opening a Data Source*.

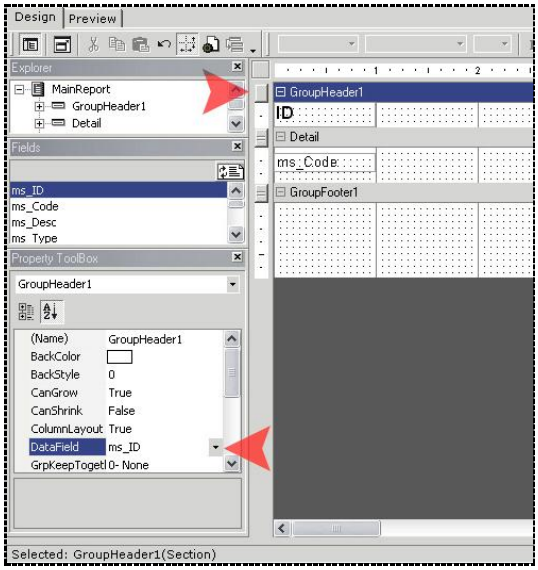


After setting the data source, remove the page header; it is not needed in a sub-report because it should already be present in the main report. To do this, select the Page Header title bar, right-click, and choose Delete Selection from the popup menu that appears.



Only the Details section will remain; this is where the fields for the contents of the report will go.

Now you need a group heading. The data field you use for this heading should be the field that you use to link with the master report. It is not necessary to reflect the content of the data field in the heading but you must make sure to set the DataField in the Property ToolBox into the link field.



You can add more groups to this report, but make sure that the topmost group contains the link field.

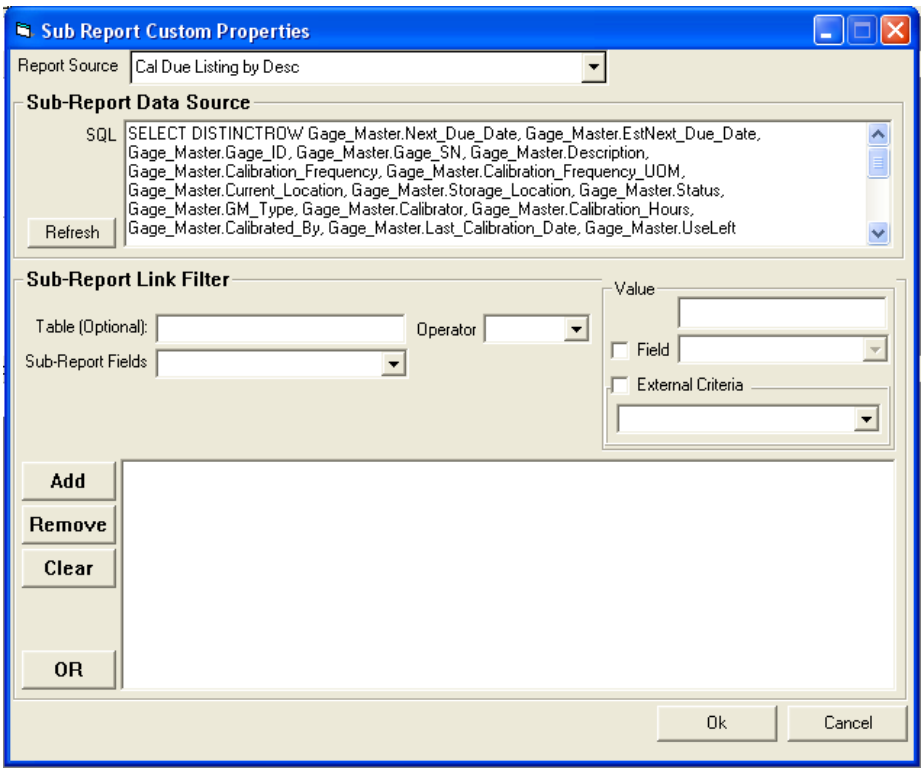
When you are done, save the sub-report with an appropriate name. We suggest that you indicate within the name that this is a sub-report, since it will not have its own page header.

Adding a Sub-Report

To add a sub-report, click on the SubReport button on the button bar , then drag the cursor across the canvas while holding down the left mouse button to form a rectangle that will be occupied by your sub-report.

Now that you have created a container for your sub-report, you must edit the link to the sub-report you created earlier. Click on the Edit Sub-Report Link button to open the Sub-Report Custom Properties window.

First, you must define the Report Source, or the name of the sub-report that has been pre-defined.



After selecting the source, you will be able to view the SQL statement that opens the data source of the report. You must now create the link filter to connect the subreport to the main report. To do so, follow these steps:

1. Select a sub-report field from the sub-report to link to the main report.
2. If more than one table in the data source contains this field, you must specify the table name in the Table field.
3. Select the operator to use in comparing the fields.
4. You have 3 choices to filter on based on the value selected:
   - Input a specified fixed value, i.e. Gage_ID = 1234.
   - Click on the checkbox to link on the list of fields found on the designer canvas of the master report.
   - External Criteria is used to directly compare a criterion derived from the main report to a sub-report field. The field must be common to the main and sub-report, meaning they must both exist in the main and sub-report

for it to work because the Advanced Filter only displays field criteria that exist in the SQL of the main report.

5. Add the criteria to the list.
6. If you need more than one criterion, repeat the first five steps using a statement connector–the default is “AND”. If you wish to use “OR” click on the OR button before creating another criterion.
7. When you are done, click OK. To discard, click Cancel.

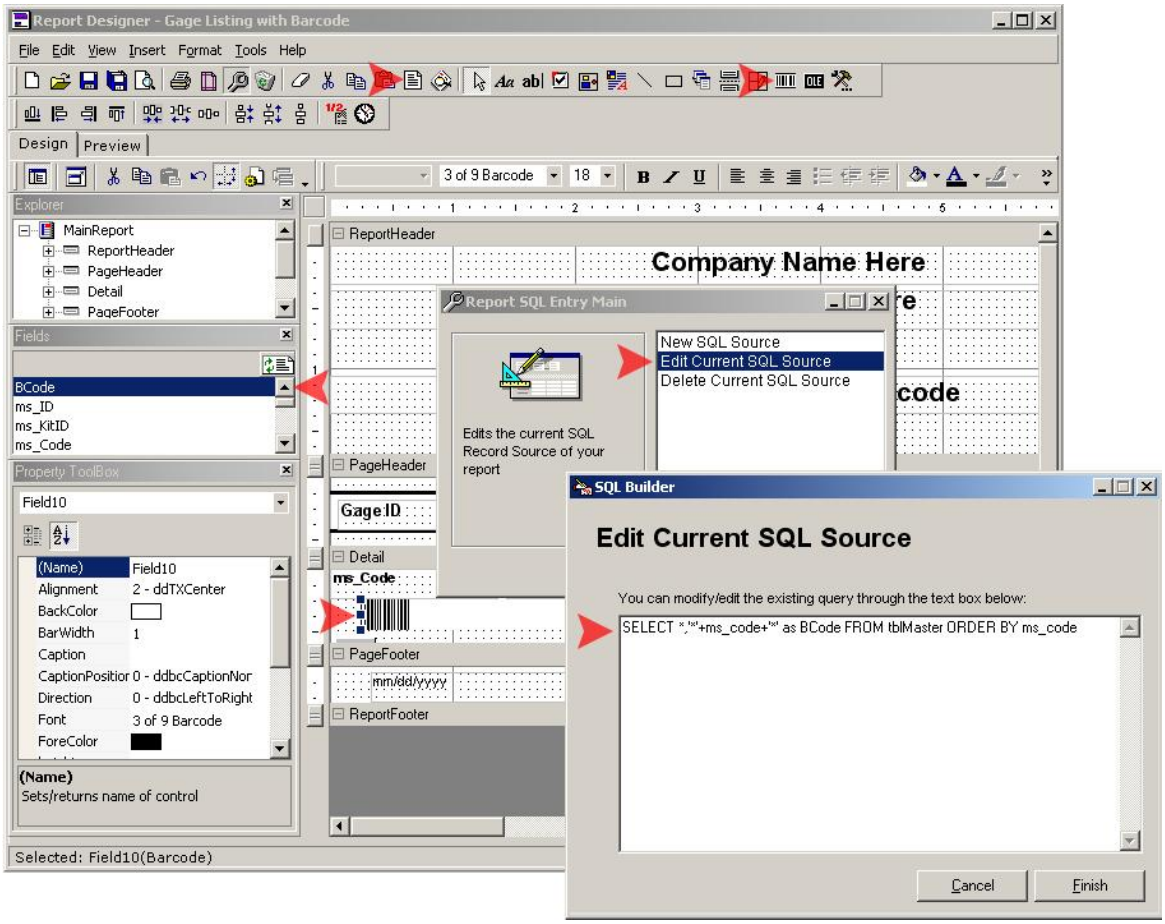
The fields of the Sub-Report Custom Properties window are described in the following table:

Field Name	Description
Report Source	This is a list box of all available reports. Select the subreport you will use from the list. **Note: Any new reports are generally found toward the bottom of the listbox.**
SQL	The SQL statement used in opening the data source of your subreport. This is a non-editable field and is provided here so you can immediately see the tables and fields that are used in your subreport. This is particularly helpful in finding out if the field you need to use for the link is contained in one or more tables.
Refresh Button	Refreshes the SQL screen
Table (optional)	If your link field is contained in more than one table in your source, you must specify the table to use for your field. If only one source table uses this field, you may leave the *Table* field blank.
Sub-Report Fields	The name of the link field from your sub-report
Operator	The operator for comparing the link field to a value
Value	You have three choices for filter value: • *Fixed*–your report will be limited to only the value entered • *Field*–this list box is taken from all the available fields of your master report • *External*- fields in the main report SQL statement
Add, Remove and Clear Buttons	Click the *Add* button to add a criterion. Select a criterion from the list and click on *Remove* to delete the selected criterion. The *Clear* button deletes all criteria.
Or Button	By default, criteria are linked with the “AND” connector. Select the *OR* button before adding a criterion to use “OR” instead of “AND”.
Ok Button	Click *OK* to apply the changes you have made to your criteria.
Cancel Button	Click *Cancel* to discard the changes you have made to your criteria.

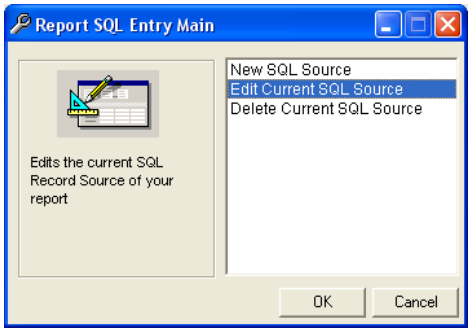
Adding a Bar Code

Bar codes of Gage IDs can be created by adding the terminator character * at the beginning and end of the Gage ID and formatting the resulting character string in a bar code font. Since the Gage IDs are taken directly from the field data, it’s easy to do this

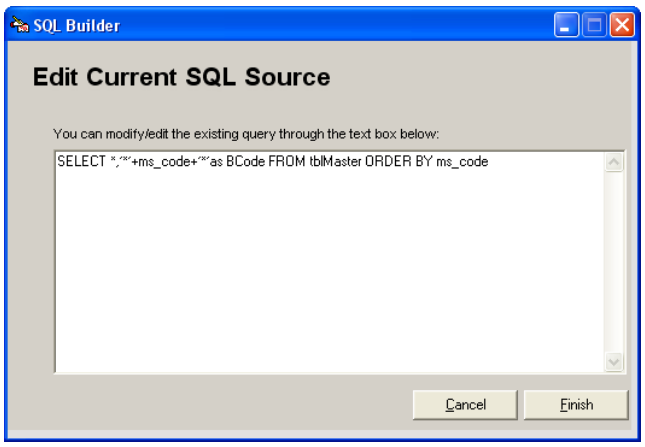
automatically to all your Gage IDs without altering your database. One way to do this is to modify the SQL statement for your data source and add a new field containing the terminator characters and the Gage ID field, giving it an alias such as BCode.



This illustration shows the source code for the currently selected report. Use the Set or Build SQL Source for the Report button on the button bar and select the Edit Current SQL Source from the selection list to open the SQL Builder window.

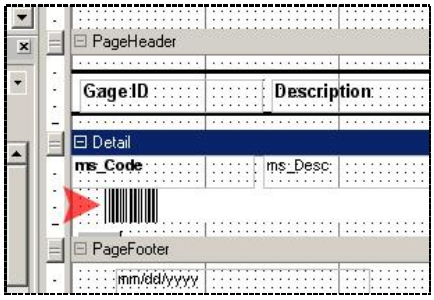


Now, you can directly modify the SQL statement for the source in the edit field as shown below:

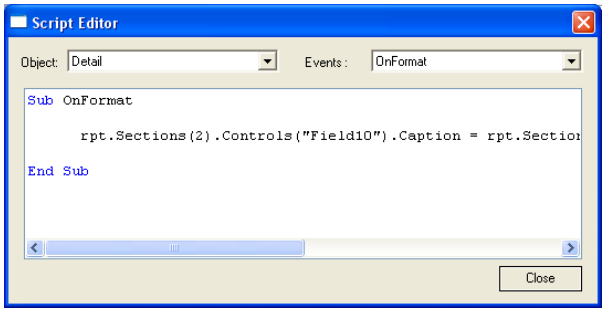

SQL Builder
Edit Current SQL Source
You can modify/edit the existing query through the text box below:
SELECT '*'+ms_code+'*'as BCode FROM tblMaster ORDER BY ms_code
Cancel
Finish

In the above example, after including all the fields from the table tbMaster, another field is added. The part of the statement `'*'+ms_code+'*'as BCode…` contains the `+` symbol (also known as the concatenator symbol), adds the `*` symbol at the beginning and end of the code, and then applies the alias `BCode`. This new field name is now included in the Fields window.

To add a bar code to the report, first click on the Bar Code button and drag a rectangle area in the report field where you wish to put your bar code. Now click on the title bar of the part of your canvas where you placed your bar code. In this case, select the Detail bar.



Currently there is only one way of linking the bar code item to the bar code field “Bcode” you created. Click on the View Script button to open the script window.



If you want to use a numeric field for your bar code, use the “&” instead of the “+” sign.

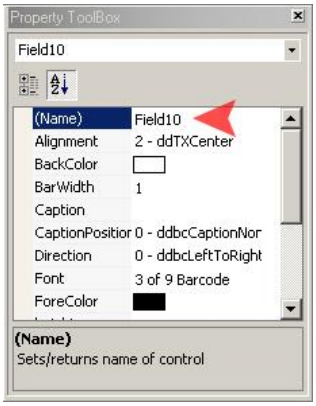
```
"*" & ms_id & "*"
```

The “&” converts the value of the numeric field into string so it can concatenate properly with the two “*” .

Follow the syntax below to set up your script for linking the bar code to the bar code field:

```
Sub OnFormat
    rpt.Sections(2).Controls("Field10").Caption =
    rpt.Sections(2).Controls("DataControl1").Recordset.
    Fields("BCode").Value
End Sub
```

Here, `Field10` is the name of the bar code field that you created in your report and `BCode` is the data field that you created in setting up your data source. This is VBScript. Just copy the script and remember to keep the lines 2, 3 and 4 together or in one row (between Sub and End Sub). The line has been divided into 3 parts for illustration purposes only, to fit within the page margins.

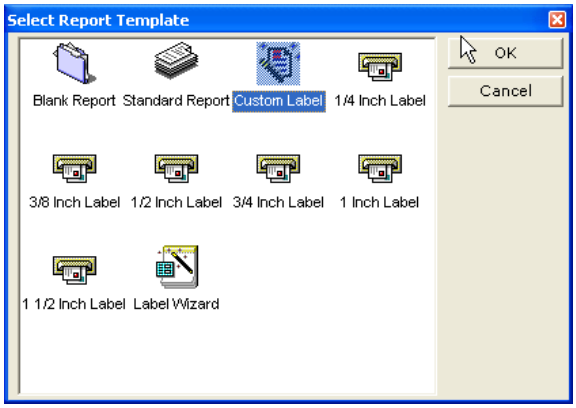


In `"rpt.Sections(2)"`, 2 is the index number of the *Detail* Section. You can use `"rpt.Sections("Details")"` (replacing `"2"` with `"Details"`). The double quotes are necessary for *Strings* in the statement. In our example you start with 0 from the top most section so *Details* will be section 2. The same holds for the *Controls* since you do not know the index number of the bar code control you created; you can just include the name of the control enclosed in double quotes. (`Controls("Field10"`)

Creating Labels in Report Editor

Automatically creating labels is a breeze with the report editor. Imagine creating labels manually, from a printed list, for 100 gages. Even with label designer software, you would still have to change each label manually unless your software were linked to a database.

The report editor includes predefined label templates, a custom label designer, and even a label wizard.

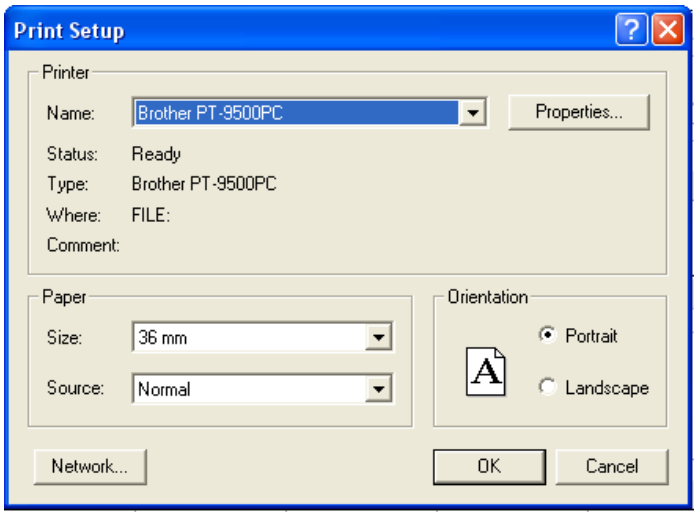


Setup is just like report setup–design your individual labels and the program does the printing for you. To print labels, you must have the GAGEtrak Calibration Label Printer.

As with designing a report, you open up a data source and drag fields and field labels to the label you are creating as needed. You can add bar codes too: the process is the same as the process of adding bar codes to any other report.

Custom Label

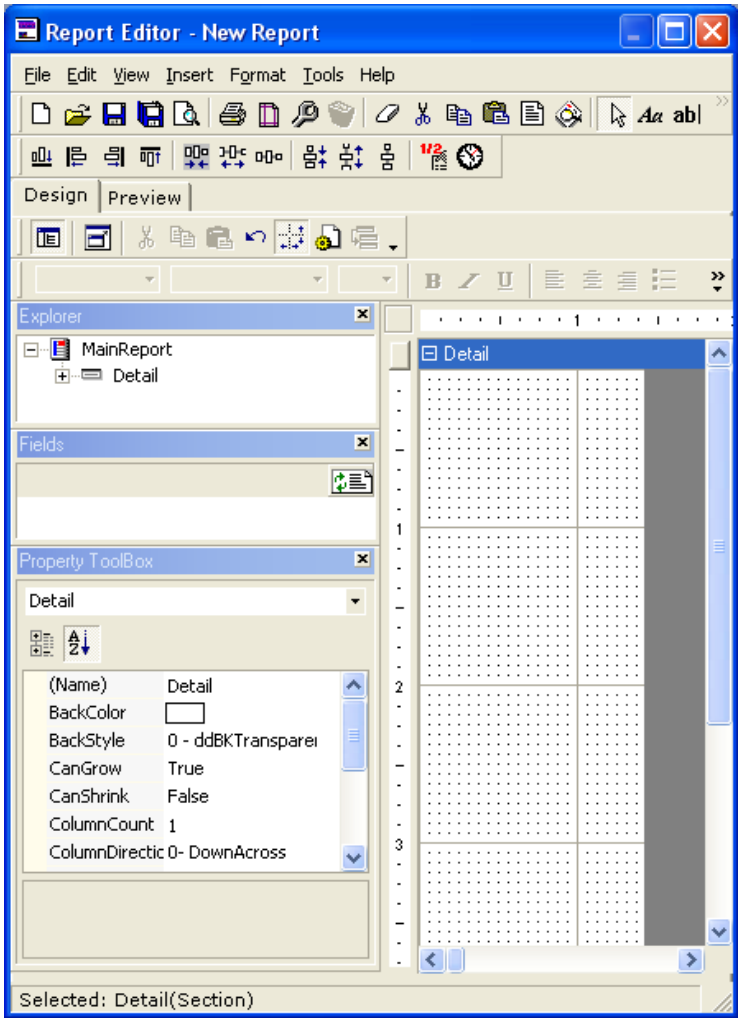
When you select this option, you will first be prompted to set up your label printer.



You must specify the label printer and the size of the label you will use correctly. If your default printer is not a label printer and you choose to use it anyway, a dialog box will appear asking if you wish to continue using that printer.

The program will attempt to set the canvas to the smallest possible area your chosen printer can handle. An error message may come up–just click OK and the canvas will appear and you can just go on making your label. For now, you can ignore this message; the report editor is simply telling you that it does not have a proper label size to use.

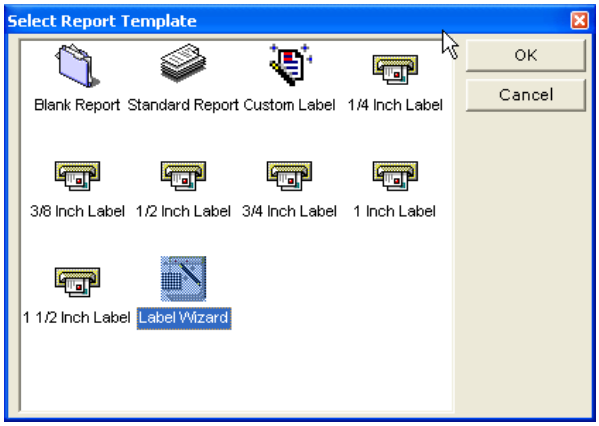
Create your label as you would a report. You may notice that the designer canvas only contains a Details section that is because it is the only section required for developing labels.



Label Wizard

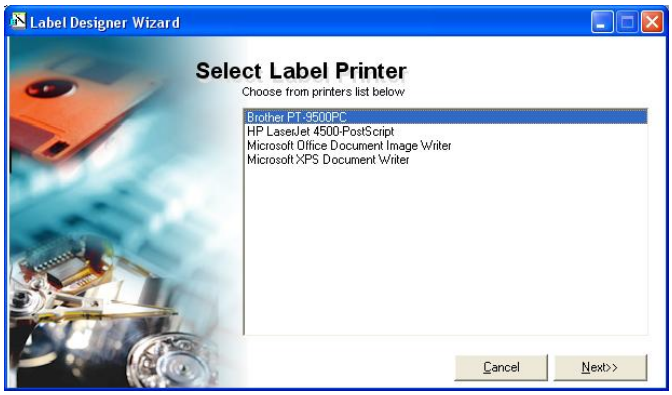
The Label Wizard takes you step by step through the process of building your labels. You will have to choose your label printer from the list of all available printers, the label size, the table to use, and the fields to include in your label.

To open the wizard, click the Create New Report button and select the Label Wizard icon from the template list.



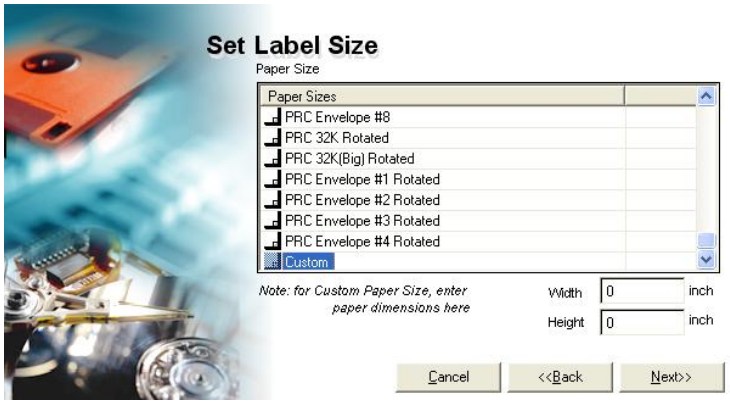
Click OK, then follow the steps listed below:

1. Select Label Printer–Select from a list of all available printers. You should have a least one-label printer. In the absence of one, the program will try to approximate the smallest possible printable size for your printer. After you have made your selection, go on to the next step by clicking on the Next button.



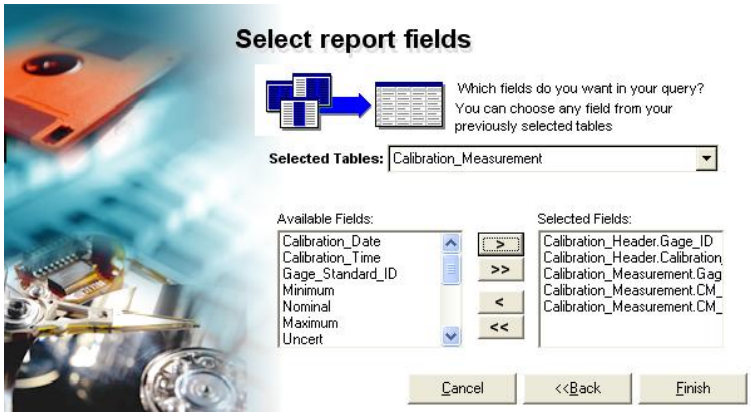
2. Select Label Size–Select from a scrollable list of available paper sizes supported by your printer.

This list is automatically taken from your printer information file. Clicking on a size from the Paper Size list displays the size of the label, in inches, in the Width and Height fields located below the paper size list. In the design stage you have to consider margins for your printable page. For custom label sizes, you must enter the dimensions of your label in inches in the Width and Height fields. Once you have done this, go on to the next step by clicking Next.



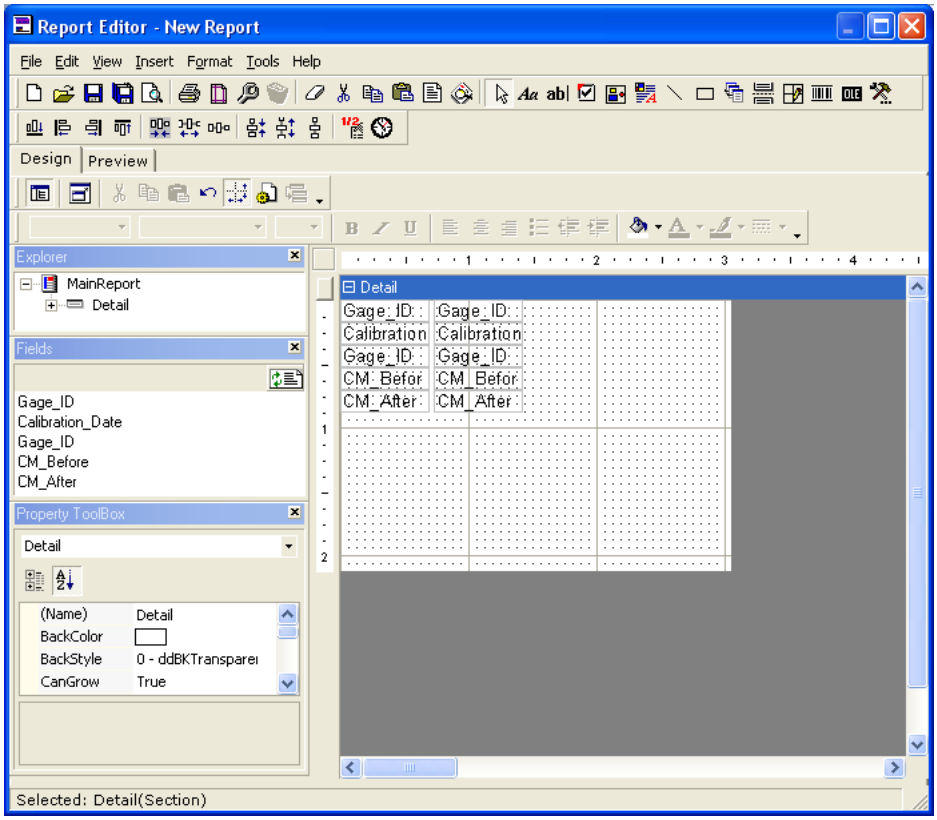
3. Select Report Tables–Now, choose from all available tables in your database by highlighting the table name and clicking the > button. You can select multiple tables, but since the links will not be established, you must make sure that both tables have records in them that match or have at least one common field. Only matching records will be shown. We recommend that you select only one table in making your labels.

4. Select Report Fields–Choose the fields you need for your label from the list of all the fields in the selected table. When you are done, click Finish to edit your label in the report editor.



The Label Wizard automatically generates your data source SQL statement and arranges all the labels and fields on the Details section of the designer canvas.

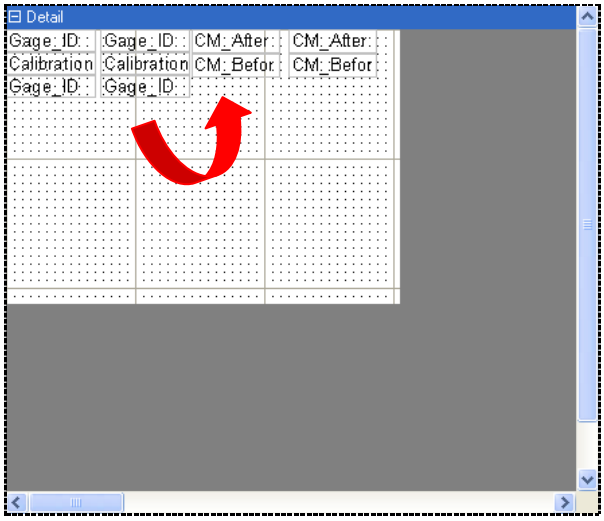
Note: Sometimes, the height of the Detail section is greater than the label height set for your label printer. Remember that the height value is in twips, and 1 inch is equal to 1440 twips. Therefore, a 6mm label—about 1/4"—would be approximately 340 twips.



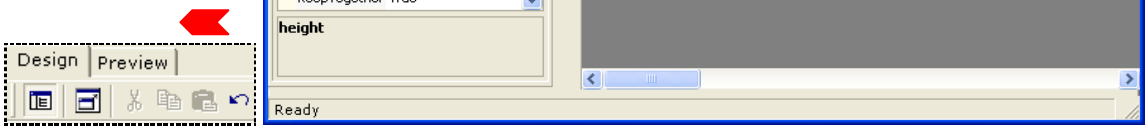
On some systems, the Detail section height will expand to allow most of the labels and fields to be viewed. Remember that the Label Wizard automatically puts all available labels and fields on the designer canvas, one set (label and field) at a time. If you think that there may be more fields than can be viewed because the section height is not large enough, just adjust the height value to a large enough value to view all of your fields—for starters try a height of 7000.

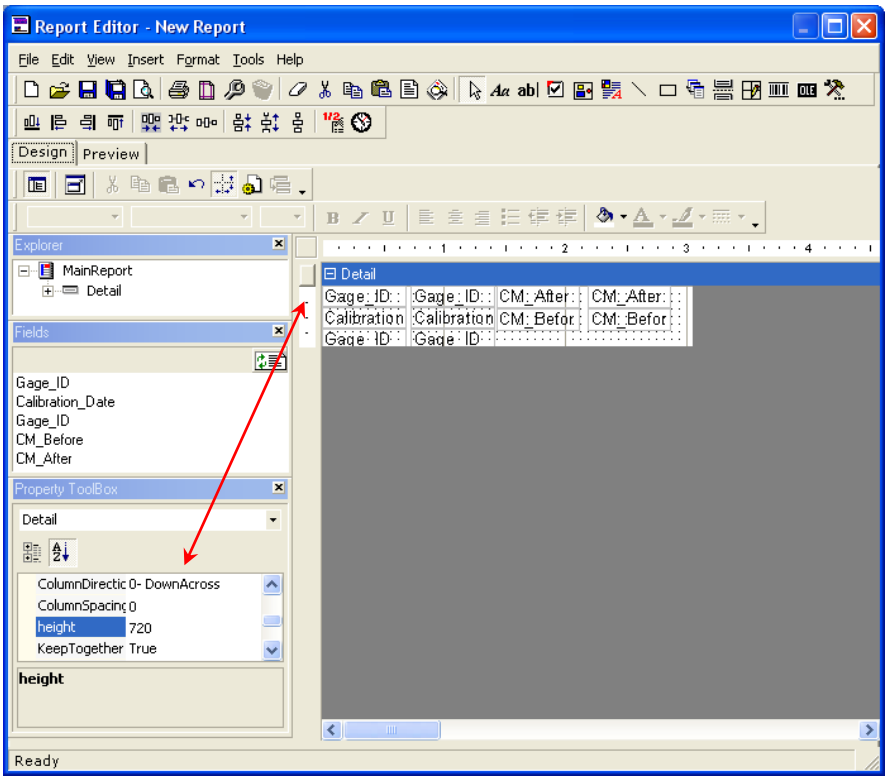
> **Note:** **Make note of the height value in the Details section because you will have to revert to it after the label design is complete.**

Once all the labels and fields are visible, you can drag them anywhere on the canvas you wish.



Click the Preview tab to view your label to make sure all your data fits within the label area. Be sure to change the height of the label back to the value it had before you extended the height of the label.





Appendix A: Data Transfer Utility

The Data Transfer Utility Wizard has three options:

- Run Scripts—this option is for users who have opted to use MSSQL to store their data. When the Run Scripts utility is ran the utility will run the scripts needed to build the tables.
- Transfer Data—this option is used to migrate data from older versions of our software to upgraded versions e.g. GAGEtrak 5.0 to GAGEtrak 6.5.
- Update/Add Reports—this option is used to update older versions of reports and/or add new reports.

Use this separate utility only once, and only if you're upgrading to GAGEtrak 6.5 from an earlier version of GAGEtrak (v5.59 or earlier) requires a data transfer or if you're using a client/server setup with Version 6.

Note: A data transfer is NOT necessary for current GAGEtrak 6.5 users.

Version 3	*3* means any GAGEtrak Version 3 or higher (including GAGEtrak 97 and GAGEtrak Version 3). For GAGEtrak 97 (32-bit), the database file is DATA9731.MDB; the archive file can be named either ARCH9731.MDB or ARCH9735.MDB. For GAGEtrak Version 3 (16-bit), the database file is DATA30.MDB; the archive file is ARCHIVE.MDB.
Version 4	*4* means any GAGEtrak Version 4. The database and archive are in one file–GTDATA40.MDB.
Version 5	*5* means any GAGEtrak Version 5. The database and archive are in one file–GTDATA50.MDB.
Version 5.5	*5.5* means any GAGEtrak Version 5.5. The database and archive are in one file–GTDATA55.MDB.

Running the DTU *overwrites* your GAGEtrak 6.5 database. Running the DTU incorporates new fields, tables, and reports that have been added to GAGEtrak 6.5; new client/server users need to run it in order to transfer the prefilled settings (such as status IDs) to the client/server database. If you're a new user with an Access database, these settings are already in the database, so you do not need to run the DTU.

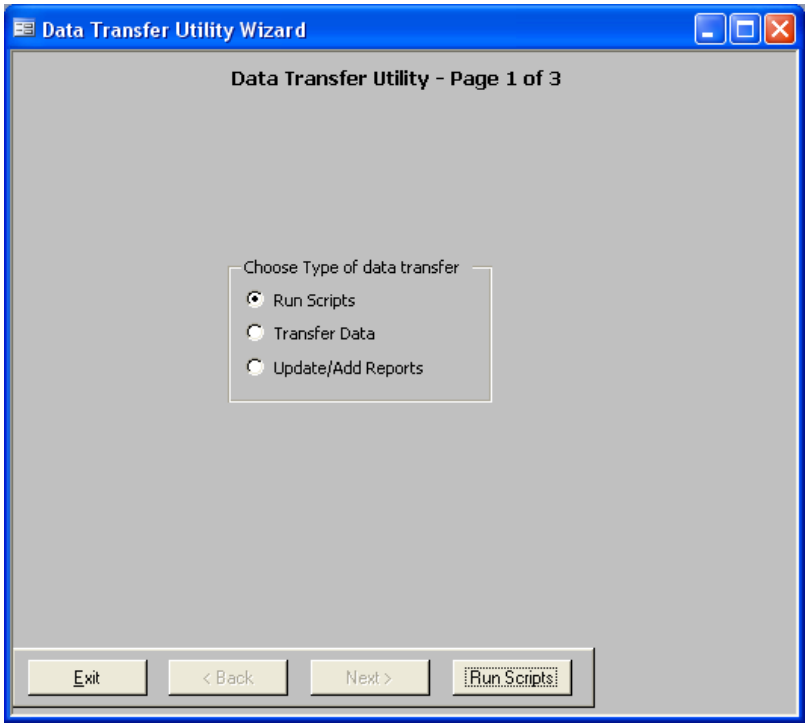
After you run the DTU, your records will be in both your old and new versions of GAGEtrak. However, do not use your old version of GAGEtrak; use the destination database that was used during the DTU, which will contain current records from an earlier version of GAGEtrak to the newest version of GAGEtrak.

Running the Data Transfer Utility

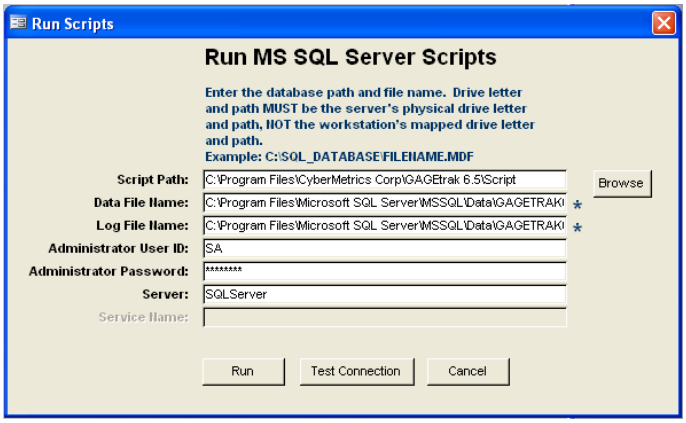
To run the Data Transfer Utility, click the Start button, select Programs, and then select the GAGEtrak 6.7 program group. Choose Data Transfer Utility from this program group to use the Data Transfer Utility.

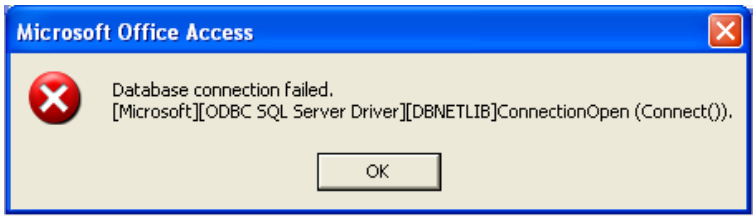
Client/Server Versions—Before You Run the DTU

If you're using a client/server version of GAGEtrak, you must run scripts to set up your database and tables before you transfer your data. To do so, click the Run Scripts button on the main DTU screen.



The Run Scripts screen will appear. The table below contains information about the fields and buttons in this screen.

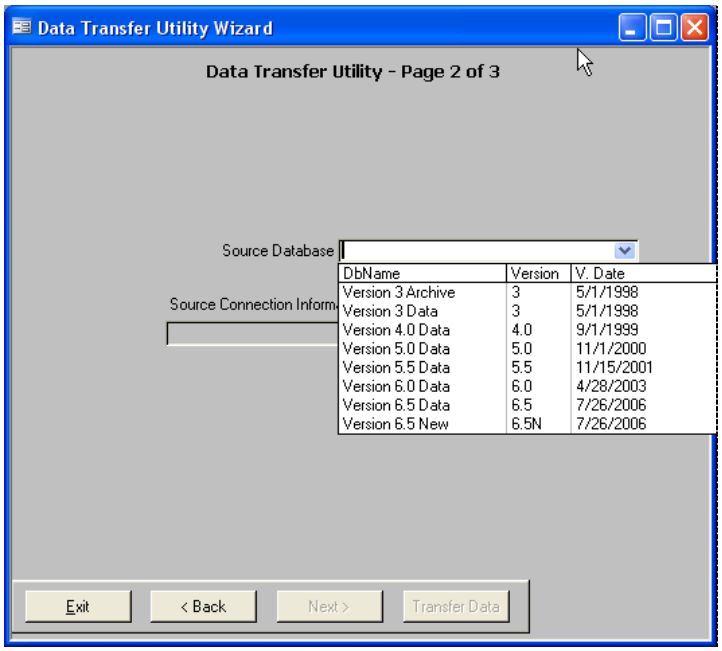


Field/Button Name	Description
Script Path and Browse	This field contains the location of the "Scripts" file for the current workstation. It defaults to the same path that the **DTU** is in for the current workstation. If this path is incorrect, a message similar to the message below will appear:  Select OK, and then click on Browse to find the directory where the "Scripts" file is located.
Data File Name	Enter the name and server location of the GAGEtrak 6.5 data file. The letter for the drive must be its physical drive letter, not a mapped letter. For example, if your server has a physical drive (D) that's mapped to as a different letter (F), enter `D` followed by the rest of the path. Remember to include " `.MDF` " (master database file) as the file extension.
Log File Name (MS SQL only)	MS SQL users should enter the name and server location of the log file. We recommend that you use the same path as for the data file (again, using the drive letter of the physical drive). Remember to include " `.LDF` " (library definition file) as the file extension.
Administrator User ID and Password	Enter the Administrator User ID = `SA`, and password of your database administrator.
Server (MS SQL only)	MS SQL users must enter the server name in this field. For example, if the server name is "Company_NT", enter that name in this field.
Service Name (Oracle only)	Not supported.
Run	When you've finished entering all of the necessary information, click this button to run the scripts.
Test Connection	Click this button to make sure that you're connected to the correct path before you run the scripts.
Cancel	To exit this screen without running the scripts, click *Cancel* to return to the main **DTU** screen.

When you're finished running the scripts, you can begin transferring data and/or updating or adding reports.

Data Transfer Instructions–Version 5.5, 5, 4, and 3 Access Users to Client/Server Version 6

Converting your database file—GTDATA55.MDB, GTDATA50.MDB, GTDATA40.MDB, and DATA9731.MDB



1. Under Source Database (from where data is being transferred), select a database based on application version being transferred:
    - `Version 6.0 Data`
    - `Version 5.5 Data`
    - `Version 5.0 Data`
    - `Version 4.0 Data`
    - `Version 3 Data`
2. Click the Browse button on the right of the Source Connection Information field to navigate to your database file. You will be presented with an Open Database window where you can choose the file path of your Source Database, GTDATA55.MDB, GTDATA50.MDB, GTDATA40.MDB, or DATA9731.MDB.

Note: If you do not recall where the Source Database is located, you can find out by opening your old version of GAGEtrak. Select the Main Menu, and the location of your database will be displayed on the lower right hand side of the form. The default location for the database is C:\GTW5\GTData55.mdb or earlier. However, depending on the options you selected during the setup of GAGEtrak, this may not be where your database is located.

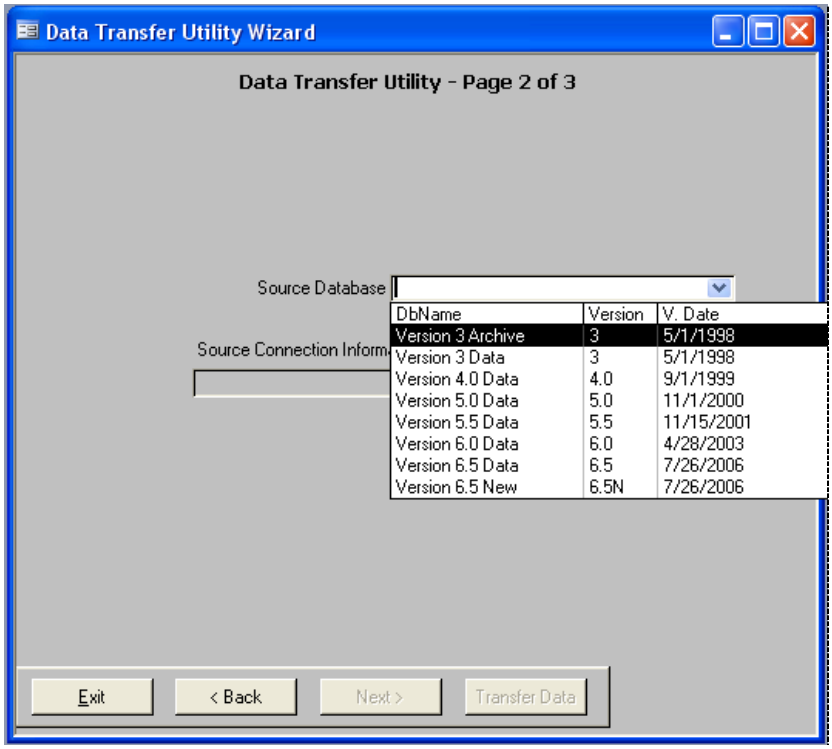
3. Select the Next button.
4. The Destination Database (from where data is being transferred to) selection functions the same as the Source Destination. First, verify that the Destination Database drop down box has Version 6.5 Data as a selection. After you have selected the Destination Database you will need to specify Destination Connection Information, (the path of where the Destination Database can be located). Click the button that is labeled Browse. You will be presented with an Open Database window where you can choose the file path for you Destination Database - GAGEtrak 6.5 database (GTDATA65.MDB).

   Note: The default location for your Destination Database **is C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5\GTData65.mdb. However, depending on the options you selected during the setup of GAGEtrak 6.7, this may not be where your database is located.**

5. Click the Transfer Data button.

Data Transfer Instructions for Version 3—Archive File

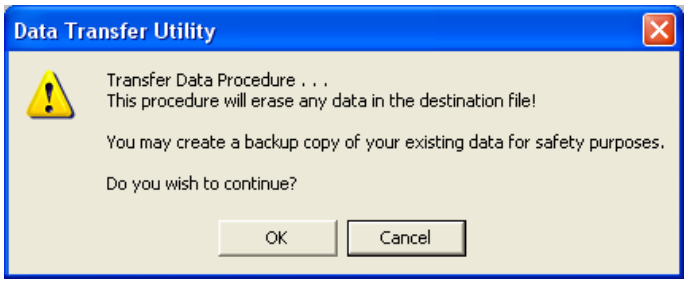
Converting your archive file—ARCH9731.MDB or ARCH9735.MDB



1. Under Source Database, select `Version 3 Archive`.
2. Click the Browse button on the right of the Source Connection Information field to navigate to your ARCH9731.MDB or ARCH9735.MDB file.
3. Select the Next button.
4. The Destination Database selection functions the same as the Source Destination. Click the small button on the right of the Destination Connection Information field to navigate to your GAGEtrak 6.5 database (GTDATA65.MDB).
5. Click the Transfer Data button.

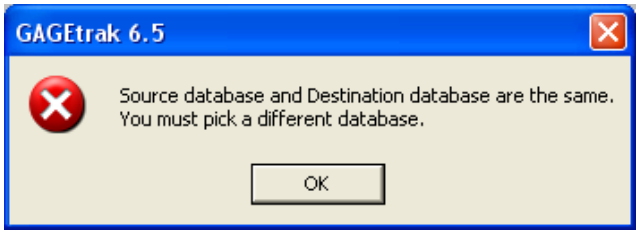
All Versions—Verify Data Transfer

After you click Transfer Data, you will be prompted with the following message:

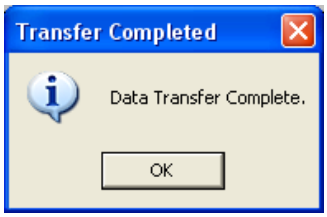

Data Transfer Utility
Transfer Data Procedure . . .
This procedure will erase any data in the destination file!
You may create a backup copy of your existing data for safety purposes.
Do you wish to continue?
OK
Cancel

If you select OK the transfer of data will begin and GAGEtrak automatically moves your data from the old database version of GAGEtrak into the new GAGEtrak 6.5 database. The data transfer may take a few minutes depending on the number of records in your existing database. If you select Cancel the DTU will terminate.

Note: If the Source and Destination file path are identical you will be presented with the following message and you must redefine you file paths:



When the transfer is finished, you'll see this message:



Click OK, will be presented with the Data Transfer Utility Records Count screen where you can check the transfer and verify that it was successful. This screen is different for each version, but the general instructions are the same.

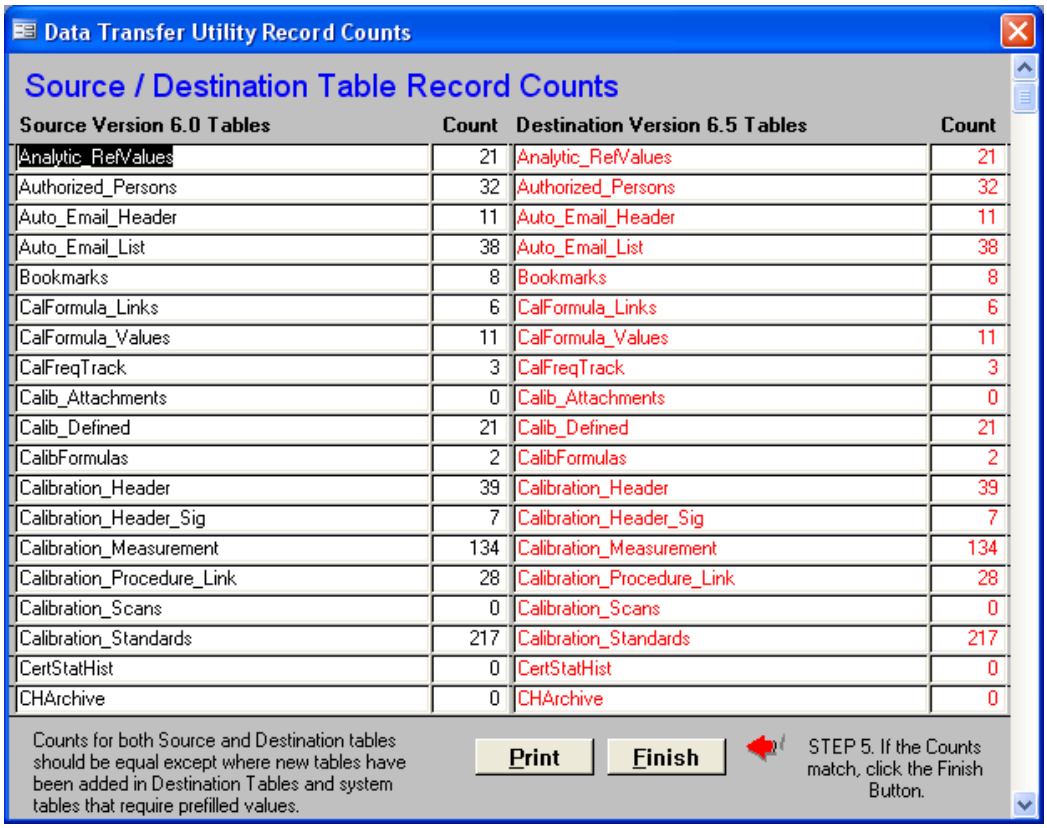
The Record Count values in the Destination tables should be greater than or equal to the Record Count values in the Source tables for those table names that appear in **both**

sections. You can ignore the table names on the Destination list that have no corresponding name on the Source list; these are GAGEtrak 6.5's new tables (the report control table will always be higher on the Destination side when you are transferring data from Version 3).

If the Record Count value for a Destination table is not greater than or equal to the value in the corresponding Source table, print the form (select File | Print) and contact Technical Support at (480) 922-7300 for assistance.

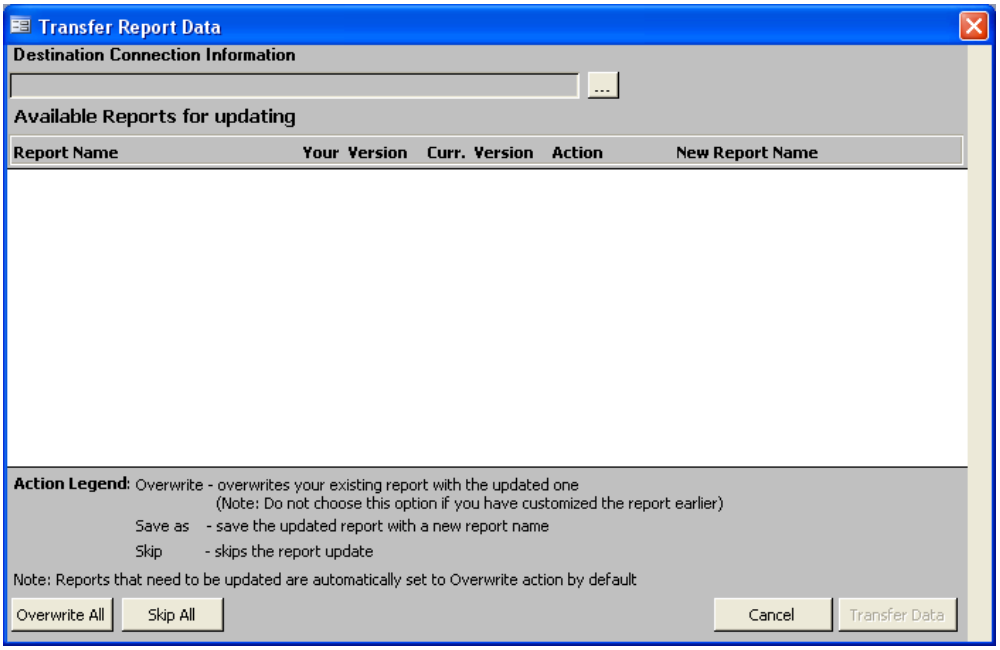
Click the Finish button to return to the main DTU window.

Sample Data Transfer from Version 6.0 Data – Similar for Version 5.0, Version 4.0, Version 3.0 Data.

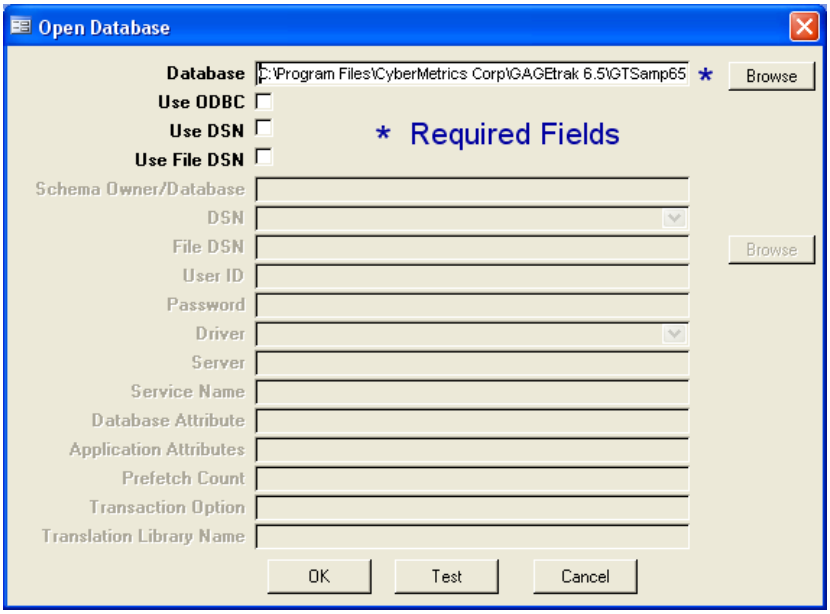

Data Transfer Utility Record Counts
Source / Destination Table Record Counts
Source Version 6.0 Tables
Count
Destination Version 6.5 Tables
Count
Analytic_RefValues 21 Analytic_RefValues 21
Authorized_Persons 32 Authorized_Persons 32
Auto_Email_Header 11 Auto_Email_Header 11
Auto_Email_List 38 Auto_Email_List 38
Bookmarks 8 Bookmarks 8
CalFormula_Links 6 CalFormula_Links 6
CalFormula_Values 11 CalFormula_Values 11
CalFreqTrack 3 CalFreqTrack 3
Calib_Attachments 0 Calib_Attachments 0
Calib_Defined 21 Calib_Defined 21
CalibFormulas 2 CalibFormulas 2
Calibration_Header 39 Calibration_Header 39
Calibration_Header_Sig 7 Calibration_Header_Sig 7
Calibration_Measurement 134 Calibration_Measurement 134
Calibration_Procedure_Link 28 Calibration_Procedure_Link 28
Calibration_Scans 0 Calibration_Scans 0
Calibration_Standards 217 Calibration_Standards 217
CertStatHist 0 CertStatHist 0
CHArchive 0 CHArchive 0
Counts for both Source and Destination tables should be equal except where new tables have been added in Destination Tables and system tables that require prefilled values.
Print
Finish
STEP 5. If the Counts match, click the Finish Button.

Update / Add Reports

To Update / Add Reports to GAGEtrak select the Update/Add Reports option and click the Next button. This will bring up the Transfer Report Data window.


Transfer Report Data
Destination Connection Information
...
Available Reports for updating
Report Name
Your Version
Curr. Version
Action
New Report Name
Action Legend: Overwrite - overwrites your existing report with the updated one
(Note: Do not choose this option if you have customized the report earlier)
Save as - save the updated report with a new report name
Skip - skips the report update
Note: Reports that need to be updated are automatically set to Overwrite action by default
Overwrite All
Skip All
Cancel
Transfer Data

Select the Destination Connection Information and then click the **...** (drill down) button to set the parameters for the update.



Click the Browse button to search your hard drive for the new GAGEtrak database. The file selected should have an .mdb file extension, designating it as a database.

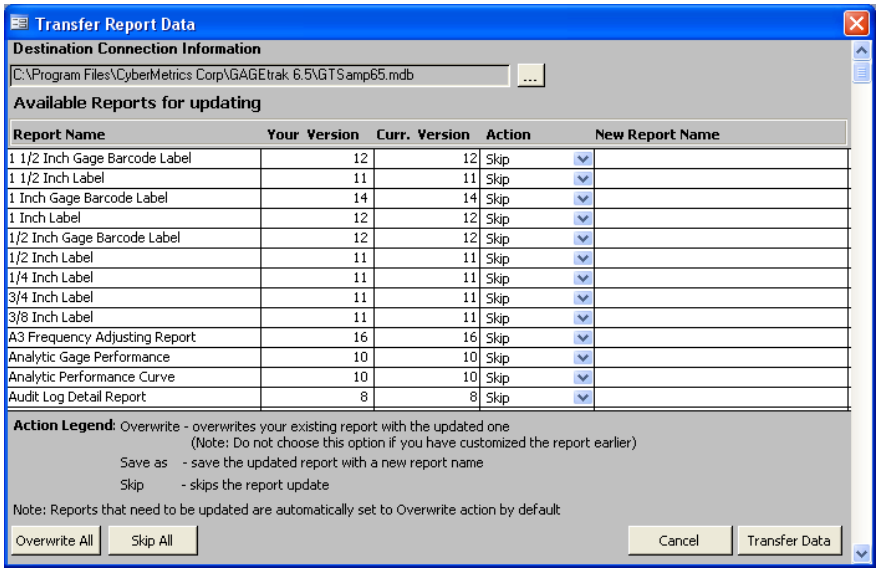
You can also select other sources from which to update your GAGEtrak database. These include:

Field/Button Name	Description

Field/Button Name	Description
Use ODBC	Check this box to use a Microsoft ODBC data source. Selecting this check box will disable the *Database Field* and enable the fields below. Note: If you are unsure of any of these settings, please consult your GAGEtrak administrator.
Use DSN	Check this box to use a Data Source Name. Selecting this check box will disable the Database Field and enable the fields below. Note: If you are unsure of any of these settings, please consult your GAGEtrak administrator. DSN—use the drop-down box to select a Data Source Name that is currently available. This field is required. No others show up
File DSN	Check this box to use a file Data Source Name. Selecting this check box will disable the Database Field and enable the fields below. Note: if you are unsure of any of these settings, please consult your GAGEtrak administrator. File DSN—type a location for the file Data Source Name or click the Browse Button to locate it on your hard drive or the network. This field is required. No others show up
Database Name	Secify a name of the database. This must be the same name as specified in your operating system as an ODBC data source. This field is required
User ID	Enter the User ID that is required to access this ODBC data source. This field is required
Password	Enter the password that is required to access this ODBC data source. This field is required.
Driver	Use the drop-down menu to select an ODBC driver. The type of driver you will use is dependent upon the type of data source (i.e., Microsoft Access file). This field is required.
Server	Enter the ODBC server name. This field is required.
Service Name	This is a string that a server application responds to when a client attempts to establish a conversation with the server
Database Attribute	This parameter may be required for certain connections. Consult your ODBC Administrator for more information.
Application Attributes	This parameter may be required for certain connections. Consult your ODBC Administrator for more information.
Prefetch Count	If the database engine supports this, this property sets the number of result set rows to be prefetched when executing a query, the purpose of which is to minimize server round trips and maximize the performance of applications.
Translation Option	Value controlling translation functionality (value of which depends on the database engine being used), which is specific to the translation DLL being used. The translation DLL contains the required functions that the driver loads and uses to perform tasks such as character-set translation.
Translation Library Name	This is the name of the translation DLL to be used in the Translation Option property.

When you have located your database, click the Test button to ensure connectivity. Upon successful connection, click the OK button to close the dialog box and the OK button to close the Open Database Window.

Once located and loaded, GAGEtrak will scan the new database and compare it against the existing reports in the current database.


Transfer Report Data
Destination Connection Information
C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5\GTSamp65.mdb
...
Available Reports for updating
Report Name | Your Version | Curr. Version | Action | New Report Name
1 1/2 Inch Gage Barcode Label 12 12 Skip
1 1/2 Inch Label 11 11 Skip
1 Inch Gage Barcode Label 14 14 Skip
1 Inch Label 12 12 Skip
1/2 Inch Gage Barcode Label 12 12 Skip
1/2 Inch Label 11 11 Skip
1/4 Inch Label 11 11 Skip
3/4 Inch Label 11 11 Skip
3/8 Inch Label 11 11 Skip
A3 Frequency Adjusting Report 16 16 Skip
Analytic Gage Performance 10 10 Skip
Analytic Performance Curve 10 10 Skip
Audit Log Detail Report 8 8 Skip
Action Legend: Overwrite - overwrites your existing report with the updated one
(Note: Do not choose this option if you have customized the report earlier)
Save as - save the updated report with a new report name
Skip - skips the report update
Note: Reports that need to be updated are automatically set to Overwrite action by default
Overwrite All
Skip All
Cancel
Transfer Data

You can take an *action* for each report available for updating, these actions are:

- Overwrite—overwrite the existing report with the new report.
- Save As—save the current report with a new name.
- Skip—do not do anything with the current report.

Note: If you have not modified any reports in the past then click *Transfer Data* to have the updated versions of the reports transferred to your database. If you have modified certain reports then you will want to locate them and select *Skip*, or if you have modified certain reports and would like to replace them with the updated report then select *Overwrite* on the *Action* drop-down to the right. Additionally if you would like to save the updated report with a new report name you can do this by selecting *Save As* from the *Action* drop-down and providing a *New Report Name* in the field to the right of the report being renamed. If all of the versions match from left to right then you need not run the DTU**. The** DTU **will not overwrite new reports that have been created by the user.**

If you are unsure about whether this utility should be run, please contact Technical Support for assistance on running the report DTU.

Appendix B: Table Definitions

Key Fields

A key field is a single field or combination of fields that the program uses to uniquely identify each record in a table. In the tables that follow, if the Data Type column contains the word "**(Key)**", it means that this field or combination of fields is a key field.

Combination Key Fields

This table shows combination key fields (two key fields are identified).

Field Name	Data Type	Field Size
Gage_ID	Text (Key)	50
Standard_ID	Text (Key)	50

The following data table is *acceptable* (at least one of the key fields is unique):

Gage_ID	Standard_ID
100-10	1-Inch Block
100-10	2-Inch Block

Whereas this data table is *not* acceptable (none of the key fields is unique):

Gage_ID	Standard_ID
100-10	1-Inch Block
100-10	1-Inch Block

Table Definitions

The next few pages contain a list of tables that are most commonly used in GAGEtrak 6.7.

Table Name – Analytic_RefValues

Description – A list of values used for analytical studies.

Associated From: Gage RR Studies

Field List	Data Type	Length
ID	Long Integer (key)	4
GRR_Results_ID	Long Integer	4

Field List	Data Type	Length
Accepts	Long Integer	4
LSRefVal1	Double	8
LSRefVal2	Double	8
LSRefVal3	Double	8
USRefVal1	Double	8
USRefVal2	Double	8
USRefVal3	Double	8

Table Name – Authorized_Persons

Description – A list of all personnel authorized to accept/return gages

Associated Form – AuthorizedGages, Auth_Persons

Field List	Data Type	Length
Auth_ID	Long Integer (key)	4
AuthName	Text (key)	100
AuthNote	Memo	0
Gage_ID	Text (key)	50

Table Name – Auto_Email_Header

Description – A list of events that trigger automatic sending of e-mail

Associated Form – Auto Emailer

Field List	Data Type	Length
Email_ID	Long Integer (key)	4
Email_Event	Text	100
Send_List	Long Integer	4
Send_IssuedTo	Long Integer	4
Email_text	Memo	0
After_Body	Long Integer	4
Send_AuthUser	Long Integer	4

Table Name – Auto_Email_List

Description – List email of a particular employee

Associated Form – Auto Email List Entry

Field List	Data Type	Length
Email_ID	Long Integer (key)	4
Employee_ID	Text (key)	50

Table Name – Bookmarks

Associated Form – frmBookmarks

Field List	Data Type	Length
UserID	Text (key)	50
Bookmarks	Memo	0
LastGages	Memo	0

Table Name – CalFormula_Links

Description – Links gages with specific Calibration data.

Field List	Data Type	Length
Gage_ID	Text	50
Calibration_Date	Date/Time	8
Calibration_Time	Date/Time	8
Gage_Standard_ID	Text	50
Before_Formula	Double	8
After_Formula	Double	8

Table Name – CalFormula_Values

Description – Stores customized calibration formulas and value of variables

Associated Form – R&R Studies

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Gage_Standard_ID	Text (key)	50
Col_Name	Text (key)	50
Formula_Var	Text (key)	50
Formula_ID	Double (key)	8
Var_Value	Double	8

Table Name – CalFreqTrack_Values

Description – Logs history of Calibration Frequency entries

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Old_Frequency	Double	8
New_Frequency	Double	8
UserName	Text	50
DateChange	Date/Time	8

Field List	Data Type	Length
TimeChange	Date/Time	8

Table Name – Calib_Attachments

Description – List path of document attached to a particular calibration record.

Associated Form – CalibAttachmentsForm (Calibration Entry – Attachment tab)

Field List	Data Type	Length
ID	Long Integer (key)	4
Gage_ID	Text	50
Calibration_Date	Date/Time	8
Calibration_Time	Date/Time	8
AttachPath	Text	255
Description	Memo	0

Table Name – Calib_Defined

Description – Contains user-defined fields for a particular calibration record.

Associated Form – Calibration Entry – User Defined tab

Field List	Data Type	Length
Item	Text (key)	50
Label_Text	Text	50
LabelFontWeight	Long Integer	4
dftLabel_Text	Text	50
Field_Type	Text	50
Field_Attrib	Text	50
List_Source	Memo	0
List_Table	Text	50
List_Field	Text	50

Table Name – CalibFormulas

Description – Lists Calibration formulas.

Associated From – CalibFormulas

Field List	Data Type	Length
ID	Long Integer (key)	4
Formula_Name	Text	255
Formula	Memo	0

Table Name – Calibration_Header

Description – Contains calibration information (including measurements and results)

Associated From – CalHistory, Calibration Entry, SubKitHistory, Calibration Hours Graph, Edit Calibration Header, frmGage_Frequency_Adjusting_Interval, Gage Calibration Certificate Entry

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Calibration_Type	Text	50
Calibration_By	Text	50
Department	Text	50
Results	Text	50
Action_Required	Text	50
Approved	Long Integer	4
Findings	Memo	0
Calibration_Cost	Double	8
AcctNo	Text	50
TotalUncert	Double	8
ResultCode	Double	8
CalDateUpdated	Long Integer	4
CertNo	Text	50
Time_Required	Double	8
Repair_Cost	Double	8
Repair_Hours	Double	8
CalFrequency	Double	8
CalFrequency_UOM	Text	50
InCal_Freq	Double	8
InCal_Freq_UOM	Text	50
NextDue	Date/Time	8
Temperature	Text	50
Humidity	Text	50
Pressure	Text	50
Other	Text	50
CalibType	Text	50
UserDef1	Text	50
UserDef2	Text	50

Field List	Data Type	Length
UserDef3	Text	50
UserDef4	Text	50
UserDef5	Text	50
UserDef6	Text	50
UserDef7	Text	50
UserDef8	Text	50
UserDef9	Text	50
UserDef10	Text	50
UserDef11	Text	50
UserDef12	Text	50
UserDef13	Text	50
UserDef14	Text	50
UserDef15	Text	50
UserDef16	Text	50
UserDef17	Text	50
UserDef18	Text	50
UserDef19	Text	50
UserDef20	Text	50
SentToPDA	Long Integer	4
CalDiscrepancy	Long Integer	4
FloatFixed	Long Integer	4
Description	Text	50
Gage_SN	Text	50
Est_Calibration_Cost	Double	8
Calibration_Hours	Double	8
Effective_DF	Double	8
Coverage_FactorK	Double	8
Bill_To	Text	50
PassHistID	Long Integer	4
FailHistID	Long Integer	4
PreCalFreq_CurrUnits	Double	8

Table Name – Calibration_Header_Sig

Description – Lists and links signature information for every calibration entry.

Associated From – frmSubApprovedBy_Sig (Calibration Entry – Signature tab) frmSubCalibratedBy_Sig (Calibration Entry – Signature tab)

Field List	Data Type	Length
Signature_ID	Long Integer (key)	4
Gage_ID	Text	50
Calibration_Date	Date/Time	8
Calibration_Time	Date/Time	8
UserID	Text	150
Signature_Name	Text	50
Signature_Type	Long Integer	4
Signature_Date	Date/Time	8
Signature_Time	Date/Time	8
Signature_On	Long Integer	4

Table Name – Calibration_Measurement

Description – Contains information on calibration measurements for every calibration header.

Associated From – Calibration Measurement SubForm (Calibration Entry – Measurements tab), Edit Calibration Measurement

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Gage_Standard_ID	Text (key)	50
CM_Before	Double	8
CM_After	Double	8
Minimum	Double	8
Nominal	Double	8
Maximum	Double	8
Uncert	Double	8
CM_Calibration_ID	Text	50
LimitUse	Long Integer	4
Units	Text	50
CM_Type	Text	50
GM_Type	Text	50

Field List	Data Type	Length
Comments	Memo	0
GT_Format	Text	50
StdDueDate	Date/Time	8
StdLastDate	Date/Time	8

Table Name – Calibration_Procedure_Link

Description – Links and lists calibration information for a particular gage.

Associated From – Calibration Entry – Procedure tab

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Procedure_Name	Text	50

Table Name – Calibration_Scans

Description – Contains calibration scan records

Associated From – frmSubCalibration_Scans (Calibration Entry – Scans tab)

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
File_Path	Text (key)	255
Scan_Date	Date/Time	8
Form_Description	Memo	0

Table Name – Calibration_Standards

Description – Contains calibration standards information used in comparing calibration measurements.

Associated From – Calibration Standard Entry (Calibration Entry – Measurements tab), Edit Calibration Standards, Find New Measurement PDA Records, Gage Accuracy, Gage Accuracy2, Gage Accuracy Print, Gage Accuracy Print2, IDSTDForm

Field List	Data Type	Length
Gage_ID	Text (key)	50
Standard_ID	Text (key)	50
Minimum	Double	8
Nominal	Double	8
Maximum	Double	8

Field List	Data Type	Length
Units	Text	50
CS_Type	Text	50
GT_Format	Text	50
GM_Type	Text	50
Comments	Memo	0
CM_Calibration_ID	Text	50

Table Name – CertStatHist

Description – Not Used

Associated From – Not Used

Field List	Data Type	Length
HistID	Long Integer (key)	4
CertStateMemo	Memo	0
DateTimeStamp	Date/Time	8
PassState	Boolean	1

Table Name – CHArchive

Description – Contains archived calibration records.

Associated From – CHArchiveViewfrm

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Calibration_Type	Text	50
Calibration_By	Text	50
Department	Text	50
Results	Text	50
Action_Required	Text	50
Approved	Long Integer	4
Findings	Memo	0
Calibration_Cost	Double	8
AcctNo	Text	50
TotalUncert	Double	8
ResultCode	Double	8
CalDateUpdated	Long Integer	4
CertNo	Text	50
Time_Required	Double	8
Repair_Cost	Double	8
Repair_Hours	Double	8
CalFrequency	Double	8
CalFrequency_UOM	Text	50
NextDue	Date/Time	8
Temperature	Text	50
Humidity	Text	50
Pressure	Text	50
Other	Text	50
CalibType	Text	50
UserDef1	Text	50
UserDef2	Text	50
UserDef3	Text	50
UserDef4	Text	50
UserDef5	Text	50
UserDef6	Text	50

Field List	Data Type	Length
UserDef7	Text	50
UserDef8	Text	50
UserDef9	Text	50
UserDef10	Text	50
UserDef11	Text	50
UserDef12	Text	50
UserDef13	Text	50
UserDef14	Text	50
UserDef15	Text	50
UserDef16	Text	50
UserDef17	Text	50
UserDef18	Text	50
UserDef19	Text	50
UserDef20	Text	50
SentToPDA	Long Integer	4
CalDiscrepancy	Long Integer	4
FloatFixed	Long Integer	4
Description	Text	50
Gage_SN	Text	50
Est_Calibration_Cost	Double	8
Calibration_Hours	Double	8
Effective_DF	Double	8
Coverage_FactorK	Double	8
Bill_To	Text	50
InCal_Freq	Double	8
InCal_Freq_UOM	Text	50

Table Name – CheckBox

Description – Program table, used for multiple choice list boxes

Associated From – Multiple

Field List	Data Type	Length
FS_Type	Text (key)	50
FS_Order	Long Integer (key)	4
FS_Value	Text	50
Text	Text	50
Description	Text	100

Table Name – CMArchive

Description – Archived calibration measurements records

Associated From – CMArchiveViewfrm

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Gage_Standard_ID	Text (key)	50
CM_Before	Double	8
CM_After	Double	8
Minimum	Double	8
Nominal	Double	8
Maximum	Double	8
Uncert	Double	8
CM_Calibration_ID	Text	50
LimitUse	Long Integer	4
Units	Text	50
CM_Type	Text	50
GM_Type	Text	50
Comments	Memo	0
GT_Format	Text	50
StdDueDate	Date/Time	8
StdLastDate	Date/Time	8

Table Name – Customer_Adjustment_Factors

Description – Not Used

Associated From – Not Used

Field List	Data Type	Length
Adjust_ID	Long Integer (key)	4
Cust_ID	Text	50
Description	Text	50
Adj_Factors	Double	8

Table Name – Degrees_Of_Freedom

Description – Not Used

Associated From – Not Used

Field List	Data Type	Length
Degrees_of_Freedom	Text (key)	50
df_Factor	Double	8

Table Name – Dist_Factor

Description – Records Distribution Factor data used in calculating Uncertainty in Linearity Studies

Associated From – Linearity

Field List	Data Type	Length
Distribution_Type	Text (key)	50
Distribution_Factor	Double	8

Table Name – Events

Description – List of events for a specific gage

Associated From – Events

Field List	Data Type	Length
Event_ID	Long Integer (key)	4
Event	Text	50
Description	Memo	0
EAction	Text	50
ETrigger	Text	50

Table Name – ezs_SearchCriteria

Description – Stored search criteria

Associated From – Edit Search Criteria, ezs_zCriteria

Field List	Data Type	Length
SearchName	Text	50
Source	Text	50
CriteriaNumber	Long Integer (key)	4
CriteriaText	Text	255

Table Name – ezy_AuditLog

Description – Audit log records

Associated From – Audit Log

Field List	Data Type	Length
FS_DateTime	Date/Time	8
FS_User	Text	30
Object	Text	100
Action	Text	100
DataKey	Text	100
ItemNumber	Long Integer (key)	4

Table Name – ezy_AuditLogData

Description – Specific pre- and post-edit audit data

Associated From – AuditLog_Advanced, AuditLog_Basic, frmAuditLog_Detail

Field List	Data Type	Length
Item_Number	Long Integer (key)	4
Field_Name	Text (key)	100
Old_Value	Text	255
New_Value	Text	255
Memo_Value	Memo	0

Table Name – ezy_GroupCustomer

Description – Specific pre and post edit audit data

Associated From – Audit Log

Field List	Data Type	Length
GroupName	Text (key)	50
Cust_ID	Text (key)	150
OperatorStamp	Text	50
DateTimeStamp	Date/Time	8

Table Name – ezy_GroupGroup

Description – User Groups

Associated From – Security and Users

Field List	Data Type	Length
GroupName	Text (key)	50
Group_ID	Text (key)	150
OperatorStamp	Text	50
DateTimeStamp	Date/Time	8

Table Name – ezy_GroupPermissions

Description – Group security rights and restrictions

Associated From – Security

Field List	Data Type	Length
GroupName	Text (key)	50
ObjectType	Long Integer	4
ObjectName	Text (key)	255
ControlTypeName	Text	50
ControlName	Text (key)	255
Description	Text	255
ControlDescription	Text	100

Field List	Data Type	Length
Permission	Text	50
OperatorStamp	Text	50
DateTimeStamp	Date/Time	8

Table Name – ezy_Groups

Description – Security groups

Associated From – Security

Field List	Data Type	Length
GroupName	Text (key)	50
OperatorStamp	Text	50
DateTimeStamp	Date/Time	8
GroupOnly	Long Integer	4

Table Name – ezy_GroupUser

Description – Security group user list

Associated From – Security

Field List	Data Type	Length
GroupName	Text (key)	50
UserID	Text (key)	150
OperatorStamp	Text	50
DateTimeStamp	Date/Time	8

Table Name – ezy_Users

Description – Security user list

Associated From – Security

Field List	Data Type	Length
UserID	Text (key)	150
Password	Text	150
FullName	Text	50
OperatorStamp	Text	50
DateTimeStamp	Date/Time	8
OpenForm	Text	50
StatusRules	Long Integer	4

Table Name – Field_Labels

Description – Custom field label information

Associated From – Field Labels

Field List	Data Type	Length
Field_Name	Text (key)	100
Label_Text	Text	100
Status_Bar_Text	Text	255
FontWeight	Long Integer	4
dftLabel_Text	Text	100
dftStatus_Bar_Text	Text	255

Table Name – Form_Captions

Description – Lists names and captions of every form

Associated From – Form Captions

Field List	Data Type	Length
Form_Name	Text (key)	50
Form_Caption	Text	100

Table Name – Formula_Vars

Description – Stores variables of customized calibration formulas

Associated From – Formula_Vars subform

Field List	Data Type	Length
ID	Long Integer (key)	4
Formula_ID	Long Integer	4
Formula_Var	Text	255
Var_Value	Double	8

Table Name – Gage_Attachments

Description – Contains path and descriptions of attachments for a specific gage entry.

Associated From – GageAttachmentsForm (Gage Entry – Attachments tab)

Field List	Data Type	Length
ID	Long Integer (key)	4
Gage_ID	Text	50
AttachPath	Text	255
Description	Memo	0

Table Name – Gage_Events

Description – Lists events and associated application for a particular gage emtry.

Associated From – Gage Events SubForm (Gage Entry – Events tab)

Field List	Data Type	Length
Gage_ID	Text (key)	50
Event_ID	Long Integer (key)	4
App_Path	Text	255
App_Params	Text	255
Filter	Text	255

Table Name – Gage_Master

Description – Lists attributes (non-key fields) of every gage entry.

Associated From – Gage Master Entry, Staff Master Gage Issued, subKitGAGE, Calibration Cost Graph, Calibration Entry, Calibration Hours Graph, Current Cost Status by Type, Edit Gage Master, Edit Gage Procedure Links, Find New Measurement PDA Records, frmGage_Frequency_Adjusting_Interval, Gage Calibration Certificate Entry, Gage Master Print Form, Gage Master SubForm, IDREFForm, Kit Gages History, Part Master SubForm, TodaysEventSub, TodaysEventSub2

Field List	Data Type	Length
Gage_ID	Text (key)	50
Gage_SN	Text	50
Asset_No	Text	50
Model_No	Text	50
Manufacturer	Text	50
GM_Owner	Text	50
Description	Text	50
GM_Type	Text	50
Unit_of_Meas	Text	50

Field List	Data Type	Length
Standard_Group	Text	50
Drawing_No	Text	50
Drawing_Date	Date/Time	8
Change_Level	Text	50
Change_Date	Date/Time	8
Storage_Location	Text	50
Current_Location	Text	50
Service_Date	Date/Time	8
Retirement_Date	Date/Time	8
Calibrator	Text	50
Calibration_Frequency	Double	8
Calibration_Frequency_UOM	Text	50
CyclesPerDay	Double	8
Resolution	Text	50
Operating_Range	Text	50
Plus_Tolerance	Text	50
Minus_Tolerance	Text	50
Supplier_Code	Text	50
GM_Cost	Double	8
Purchase_Date	Date/Time	8
Calibration_Hours	Double	8
Est_Calibration_Cost	Double	8
CalibSkipDirection	Long Integer	4
Next_Due_Date	Date/Time	8
Last_Calibration_Date	Date/Time	8
Notes	Memo	0
Status	Text	50
User_Defined	Text	50
RefStandard	Long Integer	4
GM_Format	Text	50
Calibrated_By	Text	50
GM_Usage	Double	8
AdjPlanCode	Text	50
AdjCalFreq	Double	8
MaxAdjCalFreq	Double	8
RRFreq	Double	8
RRFreqUnits	Text	50

Field List	Data Type	Length
RRHours	Double	8
RRSkipDirection	Long Integer	4
LastRR	Date/Time	8
NextRR	Date/Time	8
RRResult	Text	50
LabelCode	Text	50
Uncert	Double	8
PriorCalDate	Date/Time	8
Nist_No	Text	50
CustomerInfo	Text	255
CalLabelSize	Text	50
UseLeft	Double	8
UseUsed	Double	8
Calibration_Frequency_DOM	Text	50
UserDef1	Text	50
UserDef2	Text	50
UserDef3	Text	50
UserDef4	Text	50
UserDef5	Text	50
UserDef6	Text	50
UserDef7	Text	50
UserDef8	Text	50
UserDef9	Text	50
UserDef10	Text	50
UserDef11	Text	50
UserDef12	Text	50
UserDef13	Text	50
UserDef14	Text	50
UserDef15	Text	50
UserDef16	Text	50
UserDef17	Text	50
UserDef18	Text	50
UserDef19	Text	50
UserDef20	Text	50
RestrictIssue	Long Integer	4
Min_CalFreq	Double	8
Max_CalFreq	Double	8

Field List	Data Type	Length
EstNext_Due_Date	Date/Time	8
FloatFixed	Long Integer	4
FloatFixedRR	Long Integer	4
PrintIssueLabel	Long Integer	4
Adjustment_Method	Text	50

Table Name – GAGE_Master_Schedule

Description – Contains calibration schedule information for a particular gage.

Associated From – Gage Entry – Schedule tab

Field List	Data Type	Length
Gage_ID	Text (key)	50
Schedule_ID	Text (key)	50
Calibrator	Text	50
Schedule_Frequency	Double	8
Schedule_Frequency_UOM	Text	50
Schedule_Hours	Double	8
ScheduleSkipDirection	Long Integer	4
Next_Due_Date	Date/Time	8
Last_Done_Date	Date/Time	8
Notes	Memo	0
AdjPlanCode	Text	50
AdjCalFreq	Double	8
MaxAdjCalFreq	Double	8

Table Name – GAGE_Reqs

Description – Gage part and usage information

Associated From – Part Master SubForm (Gage Entry – Parts)

Field List	Data Type	Length
Part_No	Text (key)	50
Gage_ID	Text (key)	50
Step_No	Text	50
Dimension	Text	50
Method	Text	50
Freq	Text	50
Comments	Memo	0

Table Name – GAGE_Status_Rules

Description – Not Used

Associated From – Not Used

Field List	Data Type	Length
UserID	Text (key)	150
Status_ID	Text (key)	50
Status	Text	20
AllowIssue	Long Integer	4
AllowView	Long Integer	4
Waiting	Long Integer	4
RequireEntry	Long Integer	4
EntryValue	Long Integer	4

Table Name – Group_Gages

Description – Not Used

Associated From – Not Used

Field List	Data Type	Length
Gage_ID	Text (key)	50
Group_ID	Text (key)	50
Gage_SN	Text	50
Description	Text	50
GM_Type	Text	50
Unit_of_Meas	Text	50
New_Field	Text	50

Table Name – Group_Master

Description – Lists attributes of a particular group

Associated From – Security

Field List	Data Type	Length
Group_ID	Text (key)	50
Description	Text	50
Group_Type	Text	50

Table Name – GRR_Results

Description – Contains Gage R&R Studies Results

Associated From – Risk Analysis, Stability Study, Edit GRR Results Header, Edit GRR Results Measurement, Gage RR ANOVA, Gage RR ANOVA Chart, Gage RR Anova Chart_MSA2, Gage RR Attribute, Gage RR Attribute Analytic, Gage RR Avg Chart, Gage RR Avg Chart_MSA2, Gage RR Comparison XY Chart, Gage RR Comparison XY Chart_MSA2, Gage RR Error Chart, Gage RR Error Chart_MSA2, Gage RR Form, Gage

RR Form_MSA2, Gage RR Linearity, Gage RR Linearity Chart, Gage RR Linearity Chart A3, Gage RR NI Chart AP, Gage RR Part Appraiser Avg Chart, Gage RR Part Appraiser_MSA2, Gage RR Range Chart AP, Gage RR Range Chart AP_MSA2, Gage RR Repeatability Range Chart, Gage RR Repeatability Range Chart_MSA2, Gage RR Residual Plot Chart, Gage RR Run Chart, Gage RR Run Chart_MSA2, Gage RR Scatter Chart, Gage RR Scatter Chart MSA2, Gage RR Stability, Gage RR Stability Chart, Gage RR Stability Chart_MSA2, Gage RR Stability SubForm, Gage RR Stability_MSA2, Gage RR Whiskers Chart, Gage RR Whiskers Chart_MSA2, Gage RR XY Chart, Gage RR XY Chart_MSA2, StabilityHistogramChart, StabilityXBarRChart, StabilitySBarRChart, StabilityXMRChart

Field List	Data Type	Length
GRR_Results_ID	Long Integer (key)	4
Gage_ID	Text	50
Gage_Desc	Text	50
Part_No	Text	50
Part_Name	Text	50
Characteristic	Text	50
Company_Part_No	Text	50
GRR_Results_Type	Text	50
Approved	Long Integer	4
Completed	Long Integer	4
GRR_Results_Date	Date/Time	8
Trials	Text	50
Parts	Text	50
Ops	Text	50
USL	Text	50
LSL	Text	50
GRR	Text	50
GRR_PCT	Text	50
EV	Text	50
EVTOL_PCT	Text	50
EVTV_PCT	Text	50
AV	Text	50
AVTOL_PCT	Text	50
AVTV_PCT	Text	50
RR	Text	50
RRTOL_PCT	Text	50

Field List	Data Type	Length
RRTV_PCT	Text	50
PV	Text	50
PVTOL_PCT	Text	50
PVTV_PCT	Text	50
R_BAR	Text	50
UCL_R	Text	50
TV	Text	50
Comments	Memo	0
C	Long Integer	4
a11	Double	8
a12	Double	8
a13	Double	8
a14	Double	8
a15	Double	8
a16	Double	8
a17	Double	8
a18	Double	8
a19	Double	8
a110	Double	8
a21	Double	8
a22	Double	8
a23	Double	8
a24	Double	8
a25	Double	8
a26	Double	8
a27	Double	8
a28	Double	8
a29	Double	8
a210	Double	8
a31	Double	8
a32	Double	8
a33	Double	8
a34	Double	8
a35	Double	8
a36	Double	8
a37	Double	8
a38	Double	8

Field List	Data Type	Length
a39	Double	8
a310	Double	8
b11	Double	8
b12	Double	8
b13	Double	8
b14	Double	8
b15	Double	8
b16	Double	8
b17	Double	8
b18	Double	8
b19	Double	8
b110	Double	8
b21	Double	8
b22	Double	8
b23	Double	8
b24	Double	8
b25	Double	8
b26	Double	8
b27	Double	8
b28	Double	8
b29	Double	8
b210	Double	8
b31	Double	8
b32	Double	8
b33	Double	8
b34	Double	8
b35	Double	8
b36	Double	8
b37	Double	8
b38	Double	8
b39	Double	8
b310	Double	8
c11	Double	8
c12	Double	8
c13	Double	8
c14	Double	8
c15	Double	8

Field List	Data Type	Length
c16	Double	8
c17	Double	8
c18	Double	8
c19	Double	8
c110	Double	8
c21	Double	8
c22	Double	8
c23	Double	8
c24	Double	8
c25	Double	8
c26	Double	8
c27	Double	8
c28	Double	8
c29	Double	8
c210	Double	8
c31	Double	8
c32	Double	8
c33	Double	8
c34	Double	8
c35	Double	8
c36	Double	8
c37	Double	8
c38	Double	8
c39	Double	8
c310	Double	8
name_a	Text	50
name_b	Text	50
name_c	Text	50
SixSigmaVar	Double	8
Ref1	Double	8
Ref2	Double	8
Ref3	Double	8
Ref4	Double	8
Ref5	Double	8
Ref6	Double	8
Ref7	Double	8
Ref8	Double	8

Field List	Data Type	Length
Ref9	Double	8
Ref10	Text	50
LinBias	Double	8
LinSlope	Double	8
LinFit	Text	100
LIN	Text	50
LINTOL_PCT	Text	50
LINPV_PCT	Text	50
ChartNo	Double	8
SubGroupNo	Text	50
NumbFormat	Text	50
PercFormat	Text	50
StdError	Text	100
Confidence	Text	100
InterceptCOE	Text	100
InterceptDF	Text	100
InterceptTSTAT	Text	100
InterceptTCRI	Text	100
SlopeCOE	Text	100
SlopeDF	Text	100
SlopeTSTAT	Text	100
SlopeTCRI	Text	100
Result	Text	255
UPL	Double	8
LOL	Double	8
HH	Double	8
HL	Double	8
LH	Double	8
LL	Double	8
StabType	Text	50
StabRes	Double	8
StabRef	Double	8
StabHistXBar	Double	8
StabHistSigma	Double	8
UseHistoric	Double	8
UseRange	Double	8
BiasOnly	Long Integer	4

Field List	Data Type	Length
LinearityData	Memo	0
MSA_Ver	Double	8
Gage_Resolution	Single	4

Table Name – Issue_Tracking

Description – Contains issue-tracking records in relation to a particular gage master record.

Associated From – Issue Tracking Entry, Edit Issue Tracking, Kit Gages History, PopUpIssue

Field List	Data Type	Length
Gage_ID	Text (key)	50
Issue_Date	Date/Time (key)	8
Issue_Time	Date/Time (key)	8
Issued_To	Text	50
Issued_Dept	Text	50
Received_Date	Date/Time	8
Received_Time	Date/Time	8
Received_From	Text	50
Notes	Text	50
Return_Cycles	Long Integer	4
Part_No	Text	50
Issue_Tracking_Type	Text	50
PO_No	Text	50
ExpReturnDate	Date/Time	8
Kit_ID	Text	50

Table Name – Issue_Tracking_Archive

Description – Archived issue-tracking records

Associated From – CIArchiveViewfrm

Field List	Data Type	Length
Gage_ID	Text (key)	50
Issue_Date	Date/Time (key)	8
Issue_Time	Date/Time (key)	8
Issued_To	Text	50
Issued_Dept	Text	50
Received_Date	Date/Time	8
Received_Time	Date/Time	8

Field List	Data Type	Length
Received_From	Text	50
Notes	Text	50
Return_Cycles	Long Integer	4
Part_No	Text	50
Issue_Tracking_Type	Text	50
PO_No	Text	50
ExpReturnDate	Date/Time	8
Kit_ID	Text	50

Table Name – Kit_Issue_Tracking

Description – Contains usage and issue records of a particular Kit.

Associated From – Kit Issue, Kit Issue, Kit Return,

Field List	Data Type	Length
Kit_ID	Text (key)	50
Issue_Date	Date/Time (key)	8
Issue_Time	Date/Time (key)	8
Issued_To	Text	50
Issued_Dept	Text	50
Received_Date	Date/Time	8
Received_Time	Date/Time	8
Received_From	Text	50
Notes	Memo	0
Issue_Tracking_Type	Text	50
ExpReturnDate	Date/Time	8

Table Name – Kit_Master

Description – Lists attributes (both primary and non-key fields) of every Kit.

Associated From – Kit Entry, Kit Issue, Kit Return,

Field List	Data Type	Length
Kit_ID	Text (key)	50
Kit_Description	Text	50
Kit_Storage_Location	Text	50
Kit_Current_Location	Text	50
Kit_Procedure	Memo	0
Returned	Long Integer	4

Table Name – KitGageLink

Description – List identification and description of a particular Kit.

Associated From – subKitGAGE

Field List	Data Type	Length
Kit_ID	Text (key)	50
Gage_ID	Text (key)	50

Table Name – KitGageTypeLink

Description – List the type and number of gages belonging to a Kit.

Associated From – KitRequiredGageTypes

Field List	Data Type	Length
Kit_ID	Text (key)	50
GM_Type	Text (key)	50
Quantity	Long Integer	4

Table Name – KitGageUseList

Description – Records use of gages belonging to a particular Kit

Associated From – Kit Entry

Field List	Data Type	Length
Kit_ID	Text (key)	50
Gage_ID	Text (key)	50
KitGageUseCheck	Long Integer	4
KitGageUseMemo	Memo	0
KitGageUseDesc	Text	50

Table Name – Label_Hdr

Description – Contains attributes of every label type.

Associated From – Labels

Field List	Data Type	Length
Label_Name	Text (key)	50
Description	Text	50
Height	Text	25
Width	Text	25
FontSize	Text	10
Font	Text	20
Columns	Text	1
Field_Label	Long Integer	4
Logo	Long Integer	4
Company_Logo	Long Binary	0
Logo_Align	Text	50

Field List	Data Type	Length
H_Company1	Long Integer	4
H_Company2	Long Integer	4
Text_Align	Text	50
Field_Align	Text	50
LT1_C1	Text	255
LT2_C1	Text	255
LT3_C1	Text	255
LT4_C1	Text	255
LT5_C1	Text	255
LT6_C1	Text	255
LT7_C1	Text	255
LT8_C1	Text	255
LF1_C1	Text	255
LF2_C1	Text	255
LF3_C1	Text	255
LF4_C1	Text	255
LF5_C1	Text	255
LF6_C1	Text	255
LF7_C1	Text	255
LF8_C1	Text	255
LT1_C2	Text	255
LT2_C2	Text	255
LT3_C2	Text	255
LT4_C2	Text	255
LT5_C2	Text	255
LT6_C2	Text	255
LT7_C2	Text	255
LT8_C2	Text	255
LF1_C2	Text	255
LF2_C2	Text	255
LF3_C2	Text	255
LF4_C2	Text	255
LF5_C2	Text	255
LF6_C2	Text	255
LF7_C2	Text	255
LF8_C2	Text	255

Table Name – Letter

Description – Service Request notification and update letters.

Associated From – Edit Service Request Letter, Letter Entry

Field List	Data Type	Length
Letter_Type	Text (key)	50
Date_Authored	Date/Time	8
Authored_by	Text	50
Letter_Body	Memo	0

Table Name – Man_Sequences

Description – Internal program use

Associated From – None

Field List	Data Type	Length
Key_Field	Long Integer (key)	4
GRR_Results_ID	Long Integer	4
MDR_No	Long Integer	4
ezs_SearchCriteria	Long Integer	4
ezy_AuditLog	Long Integer	4
tblFilters	Long Integer	4
tblCriteria	Long Integer	4
Authorized_Persons	Long Integer	4
Bookmark_ID	Long Integer	4
Event_ID	Long Integer	4
Stability_ID	Long Integer	4

Table Name – MDR

Description – Contains related information of a particular service request.

Associated From – MDR Entry (Service Request Entry), Edit Service Request, MDR Gages

Field List	Data Type	Length
MDR_No	Text (key)	50
MDR_Date	Date/Time	8
Requester	Text	50
Gage_ID	Text	50
Ins_Amt	Double	8
Letter_Type	Text	50
Service_Supplier	Text	50
Status	Text	50

Field List	Data Type	Length
Completion_Date	Date/Time	8
Comments	Text	250

Table Name – MDR_Archive

Description – Archived Service Request

Field List	Data Type	Length
MDR_No	Text (key)	50
MDR_Date	Date/Time	8
Requester	Text	50
Gage_ID	Text	50
Ins_Amt	Double	8
Letter_Type	Text	50
Service_Supplier	Text	50
Status	Text	50
Completion_Date	Date/Time	8
Comments	Text	250

Table Name – MDR_Gages

Description – Contains related information for a service request of a particular gage.

Associated From – Service Request Entry

Field List	Data Type	Length
MDR_No	Text (key)	50
Requester	Text	50
Gage_ID	Text (key)	50
Ins_Amt	Double	8
Status	Text	50
Completion_Date	Date/Time	8
Comments	Text	250
Next_Due_Date	Date/Time	8

Table Name – MDR_Gages_Archive

Description – Archived MDR_Gages Records

Associated From – Service Request Entry

Field List	Data Type	Length
MDR_No	Text (key)	50
Requester	Text	50
Gage_ID	Text (key)	50
Ins_Amt	Double	8

Field List	Data Type	Length
Status	Text	50
Completion_Date	Date/Time	8
Comments	Text	250
Next_Due_Date	Date/Time	8

Table Name – Meas_Uncertainty

Description – List necessary information for calculating uncertainty measurements.

Associated From – Uncertainty

Field List	Data Type	Length
Gage_ID	Text (key)	50
Calibration_Date	Date/Time (key)	8
Calibration_Time	Date/Time (key)	8
Uncert_Contributor	Text (key)	50
Type	Text	50
Estimation	Double	8
Distribution_Type	Text	50
Distribution_Factor	Double	8
Degrees_Of_Freedom	Text	50
DF_Factor	Double	8

Table Name – Menu_Names

Description – Lists names and identifications of every menu.

Associated From – Form Menus

Field List	Data Type	Length
Menu_ID	Long Integer (key)	4
Default_Name	Text	100
Custom_Name	Text	100

Table Name – MenuBarNames

Description – File menu bar custom names

Associated From – MenuBarNames, MenubarNamesSubMenu, MenuBarNamesSubSub

Field List	Data Type	Length
MenuBarName	Text (key)	50
MenuDefaultName	Text (key)	50
MenuCustomName	Text	50

Table Name – MenuBarNamesSubMenu

Description – File submenu custom names

Associated From – Submenus

Field List	Data Type	Length
MenuBarName	Text (key)	50
MenuDefaultName	Text (key)	50
MBDefaultName	Text (key)	50
MBCustomName	Text	50

Table Name – MenuBarNamesSubSub

Description – File sub-submenu custom names

Associated From – Sub-submenus

Field List	Data Type	Length
MenuBarName	Text (key)	50
MenuDefaultName	Text (key)	50
MBDefaultName	Text (key)	50
SubMenuDefaultName	Text (key)	50
SubMenuCustomName	Text	50

Table Name – Number_Format

Description – Number Format

Associated From – NumberFormat

Field List	Data Type	Length
NumberField	Text (key)	50
NumberLink	Text (key)	50
NumberFormat	Text	50
LastNumber	Text	50

Table Name – Part_Master

Description – Contains attributes of every part record.

Associated From – Edit Part Record, Parts, Parts Master Entry, Parts Measured SubForm

Field List	Data Type	Length
Gage_ID	Text	50
Part_No	Text (key)	50
Description	Text	50
Operation	Text	50
Drawing_No	Text	50
Drawing_Date	Date/Time	8
Change_Level	Text	50
Change_Date	Date/Time	8

Field List	Data Type	Length
Insp_Procedure	Memo	0
User_Defined1	Text	50
User_Defined2	Text	50

Table Name – Part_Meas_With_Gage_Type

Description – Relates parts measured with by a particular Kit.

Associated From – Parts Measured SubForm

Field List	Data Type	Length
Kit_ID	Text (key)	50
GM_Type	Text (key)	50
Part_No	Text (key)	50

Table Name – Proc _Attachment

Description –

Associated From –

Field List	Data Type	Length
ID	Long Integer (key)	4
Procedure_Name	Text	255
AttachPath	Text	255
Description	Memo	0

Table Name – Procedure_Link

Description – Procedure Link for a particular Gage Tasks

Associated From – Calibration Entry Procedures, Gage Master Entry Procedures

Field List	Data Type	Length
Gage_ID	Text (key)	50
Procedure_Name	Text (key)	50

Table Name – Procedures

Description – Maintenance procedure information

Associated From – Calibration Entry Procedures, Edit Procedures, Gage Master Entry Procedure SubForm, Procedure Entry

Field List	Data Type	Length
Procedure_Name	Text (key)	50
Procedure_txt	Memo	0
MediaPath	Text	255
Author_Name	Text	50

Field List	Data Type	Length
Rev_Number	Text	50
Rev_Date	Date/Time	8

Table Name – Procedures_OLE

Description – Maintenance procedure file and image links

Associated From – Calibration Entry Procedures, Gage Master Entry OLE SubForm, Gage Master Entry Procedure SubForm, Procedure Entry

Field List	Data Type	Length
Procedure_Name	Text (key)	50
Procedure_OLE	Long Binary	0

Table Name – Program_Msg

Description – Program messages custom form

Associated From – Messages (Settings – Interface tab –Messages subtab), Reset Original Messages

Field List	Data Type	Length
Msg_ID	Long Integer (key)	4
Msg_Text	Memo	0
Msg_Flags	Long Integer	4
Msg_Title	Text	100
Msg_Desc	Text	250
Msg_User	Text	50
Msg_Misc	Long Integer	4

Table Name – RepControl

Description – Report control number information

Associated From – ReportControlForm

Field List	Data Type	Length
ControlID	Long Integer	4
ReportName	Text (key)	100
ControlText	Text	75
Alignment	Text	50
User1	Text	20
User2	Text	20
User3	Text	20
User4	Text	20
User5	Text	20

Table Name – ResultCodes

Description – Result Codes information

Associated From – Edit Calibration Result Codes, x_ResultList

Field List	Data Type	Length
Result_Codes_ID	Long Integer (key)	4
ResultCode	Text	50
CodeValue	Double	8
Lookback	Text	50

Table Name – Risk_Analysis

Description – Risk analysis information

Associated From – Gage RR Atribute Risk Analysis

Field List	Data Type	Length
GRR_Results_ID	Long Integer	4
RiskSeqNum	Long Integer	4
A1	Double	8
A2	Double	8
A3	Double	8
B1	Double	8
B2	Double	8
B3	Double	8
C1	Double	8
C2	Double	8
C3	Double	8
Decision	Long Integer	4
RefValue	Double	8
Code	Text	50
AppSignal	Text	50

Table Name – RootCause

Description – Not Used

Associated From – Not Used

Field List	Data Type	Length
Cause	Text (key)	50
Enabled	Long Integer	4
Description	Text	100

Table Name – Settings

Description – Program settings

Associated From – Settings, frmGage_Frequency_Adjusting_Interval, Interface, Lock Catcher Form

Field List	Data Type	Length
Settings_ID	Long Integer (key)	4
Company_Name_1	Text	50
Company_Name_2	Text	50
Company_Address_1	Text	50
Company_Address_2	Text	50
Company_City	Text	50
Company_State	Text	50
Company_Zip	Text	50
Company_Contact	Text	50
Company_Phone	Text	50
Company_Fax	Text	50
Company_Logo	Long Binary	0
Calibration_Cert_Statement	Memo	0
OpenToolPalette	Long Integer	4
ToolPaletteOrientation	Long Integer	4
ToolPaletteLocation	Double	8
Skip_Sun	Long Integer	4
Skip_Mon	Long Integer	4
Skip_Tue	Long Integer	4
Skip_Wed	Long Integer	4
Skip_Thu	Long Integer	4
Skip_Fri	Long Integer	4
Skip_Sat	Long Integer	4
AutoCalDue	Long Integer	4
AutoRRDue	Long Integer	4
DefaultFormat	Text	50
MaxUsers	Double	8
AutoAdjust	Long Integer	4
PassFactor	Double	8
FailFactor	Double	8
SkipDirection	Long Integer	4
ysnAuditTrail	Long Integer	4
strAuditLocation	Text	50

Field List	Data Type	Length
strAuditEditor	Text	15
strSerialNo	Text	50
BGColor	Long Integer	4
LineColor	Long Integer	4
TitleColor	Long Integer	4
HeadingColor	Long Integer	4
DataColor	Long Integer	4
FontNameHeadings	Text	15
FontNameData	Text	15
FontStyleHeadings	Long Integer	4
FontStyleData	Long Integer	4
LinesVisible	Long Integer	4
PageNumbers	Long Integer	4
AllowSaveReport	Long Integer	4
ShowWideLogo	Long Integer	4
BarCode	Text	50
Terminator	Text	50
CCNumberFormat	Text	50
CCLastNumber	Text	50
SRNumberFormat	Text	50
SRLastNumber	Text	50
LabelAction	Long Integer	4
AuditPurge	Long Integer	4
SecurityOn	Long Integer	4
SecurityWarning	Long Integer	4
LoginMethod	Long Integer	4
MonthsAhead	Long Integer	4
MonthsBehind	Long Integer	4
RefreshRate	Long Integer	4
GreenNumber	Long Integer	4
BlueNumber	Long Integer	4
YellowNumber	Long Integer	4
RedNumber	Long Integer	4
Flags	Long Integer	4
ProgramVersion	Double	8
Electronic_Signature_Login	Long Integer	4
ForceChangePassword	Long Integer	4

Field List	Data Type	Length
ForceChangePasswordDays	Long Integer	4
NoAllowLogin	Long Integer	4
NoAllowLoginEmails	Memo	0
PasswordMinimum	Long Integer	4
LoginInactivityPeriod	Long Integer	4
LastDateSetting	Date/Time	8
Overwrite_Warning	Long Integer	4
RestrictIssue	Long Integer	4
SecurityRestrict	Long Integer	4
LastDueEmail	Date/Time	8
GIDLastNumber	Text	50
GIDNumberFormat	Text	50
Scanned_Image_Path	Text	255
ReliabilityTarget	Double	8
OOT_Rate_Target	Double	8
DesiredDispPrecision	Long Integer	4
MinAllowInterval	Double	8
MaxAllowInterval	Double	8
ConfidenceLevel	Double	8
SCNumberFormat	Text	50
SCLastNumber	Text	50
FirstDayOfWeek	Long Integer	4
PrintIssueLabel	Long Integer	4
PagerPause	Long Integer	4
DoNotArchiveUnsignedCalib	Boolean	1
DoNotArchiveUnapprovedCalib	Boolean	1
ProcControl	Long Integer	4
Failure_Notice_Statement	Memo	0
EnableAutoGageNumber	Boolean	1
Significance_Threshold	Single	4
A3_NumberFormat	Text	50

Table Name – Skip_Dates

Description – Skip date information

Associated From – Edit Skip Dates (Settings – Calendar tab)

Field List	Data Type	Length
Skip_Date	Date/Time (key)	8

Table Name – StabilityResults

Description – Lists Stability Study information

Associated From – Stability Study SubForm

Field List	Data Type	Length
ResultID	Long Integer (key)	4
GRR_Results_ID	Long Integer	4
GRR_Results_Date	Date/Time	8
SubGroupNo	Double	8
ChartNo	Long Integer	4
s1	Double	8
s2	Double	8
s3	Double	8
s4	Double	8
s5	Double	8
s6	Double	8
s7	Double	8
s8	Double	8
s9	Double	8
s10	Double	8
LinBias	Double	8
LinSlope	Double	8
LinFit	Double	8
MR	Double	8
Notes	Memo	0
Appraiser	Text	50
MSA_Ver	Double	8

Table Name – Staff

Description – Employee information

Associated From – Staff Master, Auto Email List, Calibration Cost by Staff, Calibration Hours by Staff Graph

Field List	Data Type	Length
Employee_ID	Text (key)	50
Social_Security	Text	50
EmpName	Text	50
ysnActive	Long Integer	4
Job_Title	Text	50
CraftCode	Text	50
Date_Hired	Date/Time	8
Date_In_Job	Date/Time	8
Department	Text	50
Supervisor	Text	50
Phone_Ext	Text	50
Pager_No	Text	50
EmailName	Text	50
Address	Text	50
Address_2	Text	50
City	Text	50
State	Text	50
ZIP_Code	Text	50
Home_Phone	Text	50
WorkPhone	Text	50
DepartmentName	Text	50
Date_Of_Birth	Date/Time	8
Education	Text	50
Industry_Experience	Text	50
Related_Experience	Text	50
Management_Experience	Text	50
Salary	Double	8
Comments	Memo	0
SupervisorID	Long Integer	4
SpouseName	Text	50
EmrgcyContactName	Text	50
EmrgcyContactPhone	Text	50
Seniority	Text	50

Field List	Data Type	Length
Shift	Text	50
Crew	Text	50
SkillLevel	Text	50
User1	Text	50
User2	Text	50
Staff_Photo	Long Binary	0
Overwrite_Warning	Long Integer	4

Table Name – Staff_User_List

Description – Staff and security user cross reference table

Associated From – Staff User List

Field List	Data Type	Length
UserID	Text (key)	150
Employee_ID	Text (key)	50

Table Name – Standard_Group

Description – Contains attributes of a particular standard group.

Associated From –Standard Group SubForm, Edit Standard Group

Field List	Data Type	Length
Standard_Group	Text (key)	50
Standard_ID	Text (key)	50
Minimum	Double	8
Nominal	Double	8
Maximum	Double	8
Units	Text	50
CS_Type	Text	50
GT_Format	Text	50
GM_Type	Text	50
Comments	Memo	0
CM_Calibration_ID	Text	50

Table Name – Standard_Header

Description – Contains attributes of a particular standard.

Associated From – Standard Header

Field List	Data Type	Length
Standard_Group	Text (key)	50
Description	Text	50

Field List	Data Type	Length
Resolution	Text	50
Operating_Range	Text	50
Plus_Tolerance	Text	50
Minus_Tolerance	Text	50
FloatFixed	Long Integer	4

Table Name – States

Description – State/region/province information

Associated From – States

Field List	Data Type	Length
StateCode	Text (key)	50
State	Text	50

Table Name – Status

Description – Gage status lookup

Associated From –Status Form, Edit Status

Field List	Data Type	Length
Status_ID	Long Integer (key)	4
Status	Text	20

Table Name – Supplier_Master

Description – Supplier information

Associated From – Supplier Master, Edit Supplier Records

Field List	Data Type	Length
Supplier_Code	Text (key)	50
Supplier_Master_Name	Text	50
Salutation	Text	50
Contact	Text	50
Phone	Text	50
Fax	Text	50
EMail	Text	50
Address	Text	50
City	Text	50
State	Text	50
Zip	Text	50
Country	Text	50
Last_Review	Date/Time	8

Field List	Data Type	Length
Last_Rating	Date/Time	8
Last_Received	Date/Time	8
Last_Reject	Date/Time	8
Enabled	Long Integer	4
User1	Text	50
User2	Text	50
SupType	Text	50

Table Name – Tab_Captions

Description – Form tab custom caption names

Associated From – Form Tabs

Field List	Data Type	Length
Form_Name	Text (key)	50
Tab_Name	Text (key)	50
Tab_Caption	Text	50

Table Name – tblCriteria

Description – Internal use

Associated From – None

Field List	Data Type	Length
cr_ID	Long Integer (key)	4
cr_HeaderID	Long Integer (key)	4
cr_Field	Text	100
cr_Operator	Text	50
cr_Value	Text	50
cr_SortBy	Text	50

Table Name – tblDTUCount

Description – Internal use

Associated From – None

Field List	Data Type	Length
FromTableName	Text (key)	255
FromCount	Long Integer	4
ToTableName	Text (key)	255
ToCount	Long Integer	4
DTUVersion	Text	50
DTUDate	Date/Time	8

Table Name – tblFilters

Description – Internal use

Associated From – None

Field List	Data Type	Length
fl_ID	Long Integer (key)	4
fl_Code	Text	255
fl_Title	Text	255

Table Name – tblMenuGroup

Description – Group name listing for reports

Associated From – N/A

Field List	Data Type	Length
GroupID	Long Integer (key)	4
GroupName	Text	255

Table Name – tblReports

Description – Internal use

Associated From – None

Field List	Data Type	Length
ReportName	Text (key)	100
Structure	Memo	0
BaseSQL	Memo	0
TimeCreated	Date/Time	8
LabelMode	Long Integer	4
PrinterDevice	Text	255
PresetConnection	Text	100
HardCoded	Long Integer	4
TimeBase	Long Integer	4
TimeField	Text	50
GroupID	Long Integer	4
OriginalStructure	Memo	0
RptVersion	Long Integer	4
UpdateRpt	Long Integer	4
Author	Text	50
Company	Text	50
Keywords	Text	50
Creation_Date	Date/Time	8
ReportName	Text (key)	100

Table Name – Training

Description – Staff Training information

Associated From – Training History

Field List	Data Type	Length
ItemNumber	Long Integer (key)	4
Employee_ID	Text	50
StartDate	Date/Time	8
EndDate	Date/Time	8
Description	Text	50
FS_Hours	Double	8
CEUs	Double	8
School	Text	250
Cost	Double	8
Status	Text	50
Certification	Text	50
CertExpDate	Date/Time	8
Comments	Memo	0
User1	Text	50
User2	Text	50

Table Name – UncertaintySetup

Description – Stores data for uncertainty calculations

Associated From – Uncertainty Studies

Field List	Data Type	Length
GRR_Results_ID	Long Integer (key)	4
Setup_LinBiasPlusMinus	Single	4
Setup_OnlyBiasPlusMinus	Single	4
Setup_UncorrectedPlusMinus	Single	4
Setup_LinBiasDF	Single	4
Setup_OnlyBiasDF	Single	4
Setup_UncorrectedDF	Single	4
Setup_LinBiasInclude	Integer	2
Setup_OnlyBiasInclude	Single	4
Setup_UncorrectedInclude	Single	4
Setup_BiasCorrectedPlusMinus	Single	4
Setup_ResolutionPlusMinus	Single	4
Setup_GRRPlusMinus	Single	4
Setup_BiasCorrectedDF	Single	4

Field List	Data Type	Length
Setup_ResolutionDF	Text	50
Setup_GRRDF	Single	4
Setup_BiasCorrectedInclude	Single	4
Setup_ResolutionInclude	Single	4
Setup_GRRInclude	Single	4
Budget_Uncert_Row1	Text	50
Budget_Type_Row1	Text	50
Budget_PlusMinus_Row1	Single	4
Budget_Prob_Row1	Text	50
Budget_Divisor_Row1	Single	4
Budget_SensiCOE_Row1	Single	4
Budget_UncertCont_Row1	Single	4
Budget_DF_Row1	Text	50
Budget_Uncert_Row2	Text	50
Budget_Type_Row2	Text	50
Budget_PlusMinus_Row2	Single	4
Budget_Prob_Row2	Text	50
Budget_Divisor_Row2	Single	4
Budget_SensiCOE_Row2	Single	4
Budget_UncertCont_Row2	Single	4
Budget_DF_Row2	Text	50
Budget_Uncert_Row3	Text	50
Budget_Type_Row3	Text	50
Budget_PlusMinus_Row3	Single	4
Budget_Prob_Row3	Text	50
Budget_Divisor_Row3	Single	4
Budget_SensiCOE_Row3	Single	4
Budget_UncertCont_Row3	Single	4
Budget_DF_Row3	Text	50
Budget_Uncert_Row4	Text	50
Budget_Type_Row4	Text	50
Budget_PlusMinus_Row4	Single	4
Budget_Prob_Row4	Text	50
Budget_Divisor_Row4	Single	4
Budget_SensiCOE_Row4	Single	4
Budget_UncertCont_Row4	Single	4
Budget_DF_Row4	Text	50

Field List	Data Type	Length
Budget_Uncert_Row5	Text	50
Budget_Type_Row5	Text	50
Budget_PlusMinus_Row5	Single	4
Budget_Prob_Row5	Text	50
Budget_Divisor_Row5	Single	4
Budget_SensiCOE_Row5	Single	4
Budget_UncertCont_Row5	Single	4
Budget_DF_Row5	Text	50
Budget_Uncert_Row6	Text	50
Budget_Type_Row6	Text	50
Budget_PlusMinus_Row6	Single	4
Budget_Prob_Row6	Text	50
Budget_Divisor_Row6	Single	4
Budget_SensiCOE_Row6	Single	4
Budget_UncertCont_Row6	Single	4
Budget_DF_Row6	Text	50
Budget_Uncert_Row7	Text	50
Budget_Type_Row7	Text	50
Budget_PlusMinus_Row7	Single	4
Budget_Prob_Row7	Text	50
Budget_Divisor_Row7	Single	4
Budget_SensiCOE_Row7	Single	4
Budget_UncertCont_Row7	Single	4
Budget_DF_Row7	Text	50
Budget_Uncert_Row8	Text	50
Budget_Type_Row8	Text	50
Budget_PlusMinus_Row8	Single	4
Budget_Prob_Row8	Text	50
Budget_Divisor_Row8	Single	4
Budget_SensiCOE_Row8	Single	4
Budget_UncertCont_Row8	Single	4
Budget_DF_Row8	Text	50
tPercentConfidence	Single	4
kCoverageFactor	Single	4
CombiUncert_UC	Single	4
CombiUncert_DF	Single	4
ExpUncert_UC	Single	4

Table Name – User_Defined

Description – User-defined information

Associated From – frmGageCustom

Field List	Data Type	Length
Item	Text (key)	50
Label_Text	Text	50
LabelFontWeight	Long Integer	4
dftLabel_Text	Text	50
Field_Type	Text	50
Field_Attrib	Text	50
List_Source	Memo	0
List_Table	Text	50
List_Field	Text	50

Table Name – Users

Description – Records information about users

Associated From – Security (Users)

Field List	Data Type	Length
PIN	Text	4
User_Name	Text (key)	50
Title	Text	50
Location	Text	50
Phone	Text	50
Gage_Ac	Long Integer	4
Gage_A	Long Integer	4
Gage_M	Long Integer	4
Gage_D	Long Integer	4
Calib_Ac	Long Integer	4
Calib_A	Long Integer	4
Calib_M	Long Integer	4
Calib_D	Long Integer	4
Proc_Ac	Long Integer	4
Proc_A	Long Integer	4
Proc_M	Long Integer	4
Proc_D	Long Integer	4
IT_Ac	Long Integer	4
IT_A	Long Integer	4
IT_M	Long Integer	4

Field List	Data Type	Length
IT_D	Long Integer	4
Supp_Ac	Long Integer	4
Supp_A	Long Integer	4
Supp_M	Long Integer	4
Supp_D	Long Integer	4
GRR_Ac	Long Integer	4
GRR_A	Long Integer	4
GRR_M	Long Integer	4
GRR_D	Long Integer	4
MDR_Ac	Long Integer	4
MDR_A	Long Integer	4
MDR_M	Long Integer	4
MDR_D	Long Integer	4
REPT_M	Long Integer	4
UTIL_M	Long Integer	4
Part_Ac	Long Integer	4
Part_A	Long Integer	4
Part_M	Long Integer	4
Part_D	Long Integer	4

Appendix C: Database Management

Create a New GAGEtrak Database

You can use multiple databases with GAGEtrak. For your convenience, the program installs an empty data file in the same location as your database (named GTDATA65.EMP). Copy this empty data file for each additional database that you want to use.

Before you add a new data file, you may want to create a new folder in which to store it. Use Windows Explorer or My Computer to create the new folder. You can name your folder to identify which GTDATA65.MDB file it contains, such as “PLANT5” or “CALIPERS”, or by the name of a customer or a supplier. For example, if you had a database for three locations, you might name your folders as follows:

C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5**CHICAGO**\GTDATA65.MDB
C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5**MIAMI**\GTDATA65.MDB
C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5**SEATTLE**\GTDATA65.MDB

After you’ve created your new database, run GAGEtrak and select File | Open Database while in the main menu. Click the Browse button to navigate to the new directory containing the second GTDATA65.MDB file, then click OK.

In the lower right corner of the main menu, you’ll find the name of the database file that you’re currently using, as shown here:

GAGEtrak will remember which database file you last opened even if you quit the program and restart it later. To open and use your original GTDATA65.MDB file, select File | Open Database again, but this time go to your original directory (usually C:\Program Files\CyberMetrics Corp\GAGEtrak 6.5).

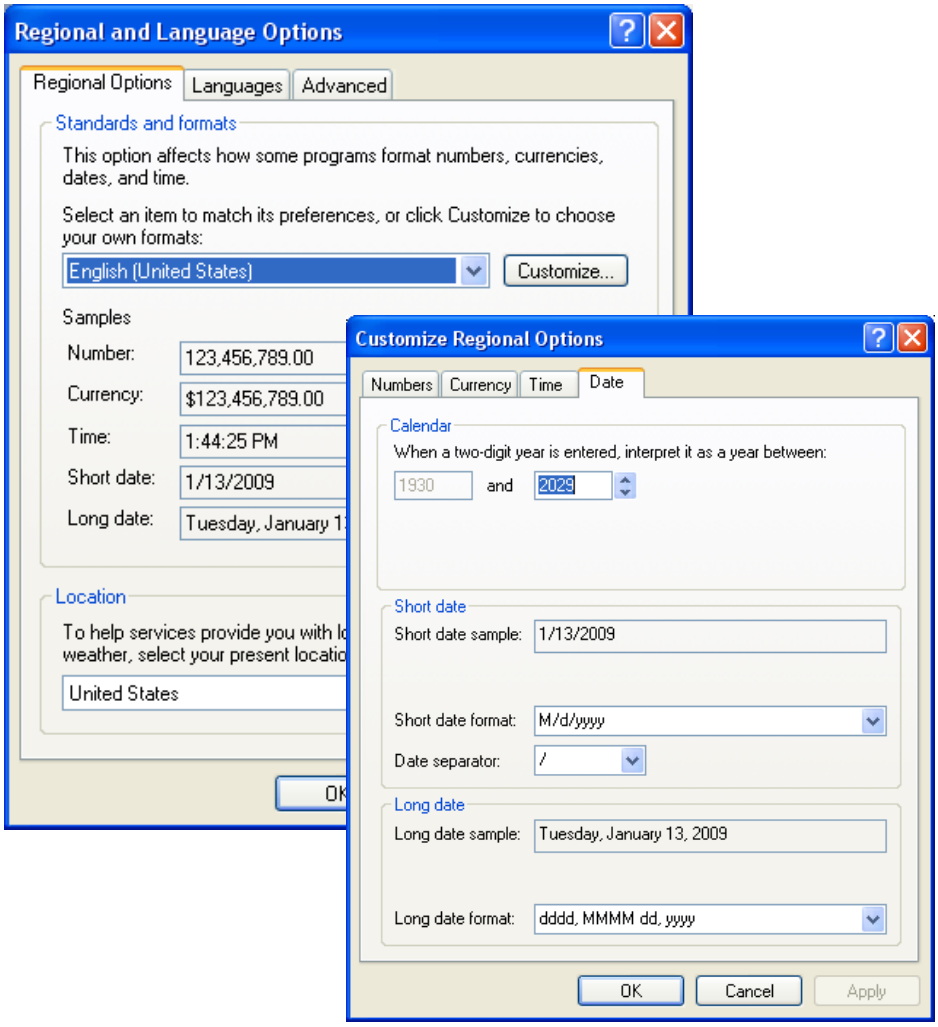
Important: Currently, no foolproof method exists for transferring records between databases. Although the Merge Utility can bring records from other databases, it is a complicated process and can easily be rendered unusable due to differences in record keeping and documentation practices. Please consider this if you decide to use multiple databases. If you do use multiple database files and later want to merge them, please contact Technical Support for assistance (there may be a small charge for this service).

Appendix D: System Maintenance and Troubleshooting

Date Formats

GAGEtrak supports all of the available numeric date formats within Windows. For example, you can represent the date of November 1, 2008 as 11/1/08, 11/01/08, 11/1/2008, 08/11/1, 08/1/11, or 2008/11/1. Because GAGEtrak's reports use only numeric dates, you can select only numeric date formats. Therefore, you can't use dates like "November 1, 2008" or "1 November 2008."

As a precaution, you may want to verify your date settings in Windows Control Panel. Select Start | Control Panel, then run the Regional and Language Options. In the Regional Options tab, click on the Customize button. The Customize Regional Options window will open up. The date formats that you enter into GAGEtrak *must match* the Windows date setting; otherwise, errors will occur while you're running the program. The sample screen shows the most popular format used in the United States.



Maintaining Your Hard Drive

We highly recommend that you run the Windows ScanDisk and Disk Defragmenter utilities to keep your hard disk running smoothly. Run ScanDisk each week to clean up cross-linked files and other problems. Next, run Disk Defragmenter to reorganize your files (this keeps your files from being spread out in pieces all over the hard drive). Your disk accesses will run somewhat faster and your hard drive will be less prone to problems. To run these utilities, check the Start button, select Programs, then choose Accessories. Highlight System Tools, then select the utility and follow the directions on your screen.

Please check with your IT department or whoever is responsible for maintaining your computer before running these utilities.

We also recommend making sure you have a current backup of your GAGEtrak data before performing any hard drive maintenance.

Maximizing Your Performance

We recommend that you keep a large amount of empty hard drive space for your operating system's virtual memory management. If you have limited resources and GAGEtrak runs slowly, try closing all other applications to devote all available system resources to GAGEtrak.

Installation Fails

If, for any reason, you can't install your CD or you receive any error messages during installation, try reinstalling the CD. If installation fails again, please write down any error messages and call Technical Support at (480) 922-7300 for further instructions.

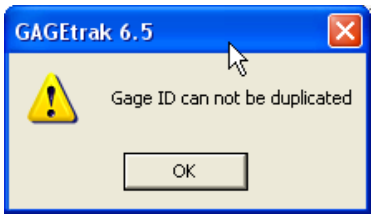
Repairing Data Files

Although GAGEtrak has been designed to be as trouble-free as possible, error messages may appear because of occurrences like power outages, accidental resetting of your computer, network disconnects, and other mishaps. In these cases, you might need to repair and compact your data file (GTDATA65.MDB). You can do this by selecting the Compact Repair/Data utility from the Data Tools menu. Depending on the size of your file, this may take several minutes to complete. **Network users should make sure that no one else is running GAGEtrak when someone is performing this operation.** If you cannot open your GAGEtrak database, click the Windows Start button, select Programs, choose the GAGEtrak 6.7 program group and run Compact Database.

If the error message persists when you're trying to run the program, contact Technical Support immediately at (480) 922-7300 for additional instructions.

Duplicate Value—Error Message

An error message may appear if you enter two records with the same key field values.



You'll receive a similar message if you enter:

- Two gage records with the same gage ID
- Two calibration standards with the same name, for the same gage
- Two procedures with the same procedure name, for the same gage
- Two calibration standard ID names on the same calibration record
- Two supplier records with the same supplier code
- Two procedures with the same procedure name
- Two parts with the same part number

If an error message appears, click OK, then click the Undo button or choose Undo from the Edit menu.

Previewing or Printing Reports—Error Message

An error message stating "The sum of the margins and the height of the page footer is greater than the length of the page you are printing on" appears if you install the P-Touch label printer and assign it as the default Windows printer. To eliminate this error, select your report printer as the default Windows printer. GAGEtrak is designed so that calibration labels are printed to the P-Touch printer as a specific printer. For more information about the label printer, please see *Appendix A* of the *User's Manual*.

P-Touch Printer Does Not Print Labels

If you can preview calibration labels, but cannot print them, you probably do not have a compatible version of the P-Touch printer driver, editor, or spooler files. If you can print labels from the P-Touch Editor program, but you get a message that your P-Touch printer is not installed or recognized, you may also have this problem. Please visit our web site (www.cybermetrics.com) to download the current P-Touch files for your operating system (if you don't have Internet access, please contact Technical Support to obtain these files).

Appendix E: Training

Three convenient and effective GAGEtrak training options are available to fit your needs: personalized web training, two-day regional training and on-site training. Anyone involved in the implementation or use of GAGEtrak Calibration Management Software will benefit from GAGEtrak training. Whether on-site, online or at a regional class, you'll learn how to save time, avoid common mistakes and get the most out of your software.

Web Training

Web training will give you the basic tools you need to quickly get started with GAGEtrak. And, if the next regional class isn't quite soon enough for you, a Web training session is a good way to fill the gap, so no time is wasted. Web training provides a good foundation for a future regional class.

Regional Classes

Having some basic GAGEtrak experience (or having had Web training) prior to attending a regional class allows you to come better prepared with questions and get much more out of the class. These classes offer more opportunity for hands-on learning and include a certificate of completion to allow you to provide proof to an auditor that you have received proper training from the software manufacturer.

Regional classes are held at our training facility in Phoenix, Arizona as well as various cities around the country. Class sizes are kept small in order to provide individual instruction and assistance.

Our talented instructors will take you step by step through planning, preparation, setup and successful operation of your GAGEtrak Calibration Management Software. You'll also learn about advanced topics such as data import and export, data filtering, system maintenance, system security, performance tuning and more.

On-site Training

Our instructor travels to your facility at your convenience and provides training that is tailored to your specific needs. On-site training enables real-world, hands-on training and can include consultation which allows you and the expert to collaborate to determine the best course of action

for your company. At the conclusion of on-site training, you will receive a completion certificate to allow you to provide proof to an auditor that you've received proper training from the software manufacturer.

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